Massachusetts Births 2003

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2003 Highlights

- **In 2003, Massachusetts had the second lowest Infant Mortality Rate (IMR) in its history.** The IMR was 4.8 infant deaths per 1,000 live births, compared with 4.9 in 2002.

- **The Cesarean section delivery rate in Massachusetts, 29.3%, was the highest** rate ever reported.

- **The percentage of low birthweight (LBW) infants** (less than 2,500 grams or 5.5 pounds), **7.6%, was the highest it has been since at least 1980.**

- **In 2003 in Massachusetts, the average age of mothers giving birth for the first time was 28.01 years, which was the oldest in state history**.

- **The Massachusetts teen birth rate has decreased steadily from 35.4 births per 1,000 women ages 15-19 in 1990 to 22.6 in 2002, and remained the same in 2003**.

- **Births in five ethnicity groups have increased more than 10% since 2002: Japanese, Mexican, Cuban, Colombian, and "Other Central American"[1].** Despite a very small percent (less than 1%) decrease in overall births from 2002, certain groups have experienced large increases in the numbers of births

- **The percentage of women smoking during pregnancy continued its steady decline over the last 14 years.** It decreased from 7.9% in 2002 to 7.7% in 2003. The percentage of smoking during pregnancy has decreased 60% since 1990, when it was 19.3%.

- **The percentage of breastfeeding among mothers in Massachusetts increased from 76.1% in 2002 to 78.1% in 2003, continuing its steady increase over the last 14 years.** The rate of breastfeeding has increased 50% since 1989, when it was 52.2%.

- **The percentage of preterm infants** (delivered before the 37th week of gestation) **increased 2% from 8.5% in 2002 to 8.7% in 2003.**

- **Disparities by race, ethnicity, education and community persist:**

    - Black non-Hispanic IMR is over 3 times that of the white non-Hispanic (12.7 vs. 4.1).
    - Teen birth rate for Hispanics is about 6 times that for white non-Hispanics (78.3 vs. 13.7).
    - Cambodian (54.0%), Cape Verdean (65.9%), and Haitian (66.4%) mothers are less likely to receive prenatal care in their first trimester compared with mothers in other ethnicity groups (State average: 83.9%).
    - Less educated women are much more likely to smoke during their pregnancies, more likely to deliver LBW infants, and less likely to receive adequate prenatal care.

[1] "Other Central American" is an ancestry choice for mothers whose ancestry is not among those of the Central American territories and countries explicitly listed (Puerto Rican, Dominican, Mexican, Cuban, and Salvadoran). The majority of mothers who choose "Other Central American include those who were born in Guatemala and Honduras, for example.

Number and Rate of Births

The number of births to Massachusetts residents declined by less than 1% (0.6%) from 2002 to 2003, from 80,624 to 80,167. Since 1990, the number of births in Massachusetts has declined by 13%, and the birth rate among women of reproductive age has declined by 9% (from 62.2 to 56.2 births per 1,000 females ages 15-44). **The average age of mothers at first birth was 29.8 years** in 2003 compared with 27.7 years in 1999.

Infant Mortality

The infant mortality rate (IMR) in 2003 was 4.8 infant deaths per 1,000 live births, compared with 4.9 in 2002. There was a total of 383 infant deaths in 2003, compared with 397 in 2002. The infant mortality rate has decreased 31% since 1990, from 7.0 deaths per 1,000 live births to 4.8 deaths per 1,000 live births.

Black non-Hispanic mothers continued to have the highest IMR (12.7 per 1,000 live births). Black non-Hispanics were the only group to experience an *increase* in IMR (9%) in 2003; whereas, IMR decreased by 21% for Hispanics (7.0 to 5.5), by 10% for Asians (3.0 to 2.7), and by 2% for white non-Hispanics (4.1 to 4.0).

Pregnancy-Associated Mortality and Maternal Mortality Ratios[2]

In 2003, there were 15 pregnancy-associated deaths, including 4 maternal deaths. The 2003 pregnancy-associated mortality ratio (PAMR) was 18.5 deaths per 100,000 live births and the maternal mortality ratio (MMR) was 4.9 per 100,000 live births. Since 1990, the annual PAMR fluctuated from a low of 18.0 in 1990 to a high of 32.8 in 2001. However, due to the small number of deaths, the differences are not statistically significant.

Teen Births

In 2003, 4,639 births occurred to Massachusetts resident women ages 15-19, which was a difference of only **3 fewer births than in this age group in 2002**. Although the overall number of births declined less than 1%, the teen birth rate remained steady. The Massachusetts teen birth rate had decreased steadily from 35.4 births per 1,000 women ages 15-19 in 1990 to the current low of 22.6 in 2002, and remained the same in 2003. The Massachusetts teen birth rate in 2003 was 46% below the preliminary U.S. teen birth rate of 41.7 births per 1,000 women ages 15-19.

The annual number of births to **young teens (ages 12-14)** continued to decline in 2003, from a peak of 155 in 1994 to the current low of 56 (a rate of 0.27 births per 1000 females aged 10-14), this represents a 23% decline in births in this age group from 1994. The 2003 U.S. birth rate for

[2] A "pregnancy-associated death" is the death of a woman while pregnant or within one year of termination of pregnancy, irrespective of cause. A "maternal death" is the death of a woman while pregnant or within 42 days of pregnancy, the cause of which is related to the pregnancy or its management. These indicators are "ratios" rather than "rates", because the denominators are *live births*, and some of the mothers who died did not deliver a live birth. See the Definition of Rates and Ratios section for further information.

younger teens was 0.70 live births per 1000 females aged 10-14 years, 61% above the Massachusetts birth rate for young teens.

The percentage of low birthweight among births to teen mothers was 10.3% in 2003, compared with 7.4% among births to mothers ages 20 and older in 2002.

In 2003, among Massachusetts municipalities with the highest number of teen births, **teen birth rates were** highest **in Holyoke (91.9), Lawrence (82.9), and Springfield (79.3).** These communities had rates over three times the statewide rate of 22.6 teen births per 1,000 females 15-19.

Low Birthweight (LBW)

The percentage of low birthweight infants (less than 2,500 grams or 5.5 pounds) increased to 7.6% in 2003 from 7.5% in 2002. Since 1990, the percentage of low birthweight infants has increased by 31%, from 5.8%.

Between 2002 and 2003, black non-Hispanics were the only group to experience a *decrease* in the percentage of low birthweight infants (4%); whereas, LBW increased by 3% for white non-Hispanics (6.8% to 7.0%), by 1% for Asians (8.0% to 8.1%), and remained the same for Hispanics (8.3%).

Between 2002 and 2003, the percentage of low birthweight infants increased slightly among singletons (5.2% to 5.3%) and among multiple births (53.0% to 55.6%).

Very low birthweight (VLBW; infants weighing less than 3.3 pounds) has remained stable since 1999, at 1.4%. For the third year in a row, black non-Hispanic infants continue to have the highest percentage of VLBW at 3.1%, the same as in 2002.

Preterm Deliveries

The percentage of preterm infants (infants delivered before the 37th week of gestation) increased 2% from 8.5% in 2002 to 8.7% in 2003. Preterm rates decreased for all race and Hispanic ethnicity groups, except for white non-Hispanics rates, which increased by 6% from 2002. Preterm rates were lowest for Asians (7.1%) and highest for black non-Hispanics (12.0%).

The percentage of infants delivered very early (before the 28th week of gestation) has remained the same since 1997 at 0.6%. Black non-Hispanic women had the highest proportion of infants delivered very early, 1.7%, which was more than double that of any other race group.

Births by Race, Hispanic Ethnicity, and Mother's Birthplace

The percentage of births to white non-Hispanic and black non-Hispanic mothers has decreased since 1990. From 1990 to 2003, it decreased by 8%, from 78.4% to 71.9% for white non-Hispanic mothers, and by 4% for black non-Hispanic mothers, from 7.7% to 7.4%. The percentage of births to Asian mothers increased by 73%, from 3.7% to 6.5%. The percent of births to Hispanic mothers increased by 33%, from 9.1% to 12.2%.

The percentage of births to non-U.S.-born mothers increased 3% between 2002 and 2003 – from 23.3% to 24.1%. **In 2003, almost 1 out of 4 births to Massachusetts residents was to a mother born outside the continental U.S., Puerto Rico, and the U.S. Territories.**

Smoking

The percentage of women who smoked during pregnancy continues its steady decline from 7.9% in 2002 to 7.7% in 2003. Decreases in smoking during pregnancy occurred among all races and Hispanic ethnicity groups except for Asians.

Prenatal Care

Adequacy of prenatal care decreased by less than 1% from 84.7% in 2002 to 84.5% in 2003. Adequacy of prenatal care is a measure of the timing and number of prenatal care visits, not an assessment of the quality of prenatal care. [Please note: these data are not comparable to data published in reports prior to 2001. Beginning with the 2001 report, the Adequacy of Prenatal Care Utilization (APNCU) Index is used to measure adequacy of prenatal care, replacing the Kessner Index. Please see Chapter 5 for more detail.]

Cesarean Sections

The Cesarean section delivery rate continues to increase. The cesarean section (c-section) rate among births to Massachusetts residents was 29.3% in 2003, an increase of 4% from 2002 (28.1%). There were increases in both primary and repeat c-sections. The primary c-section rate increased by 4%, from 20.5% to 21.4%, and the repeat c-section rate increased by 3%, from 85.3% to 87.5%. Concomitantly, the rate of vaginal births after cesarean section (VBAC) deliveries decreased substantially, from 14.7% in 2002 to 12.5% in 2003, a decrease of 15%.

Breastfeeding

The percentage of mothers breastfeeding increased from 76.1% in 2002 to 78.1% in 2003**, continuing the trend of steady increase from the last 14 years**. The breastfeeding rate increased for all major race/Hispanic ethnicity groups, with the exception of Hispanics, for whom the breastfeeding rate decreased slightly by less than 1%. The largest increase in the percentage of mothers breastfeeding was seen among black non-Hispanic mothers (up 3.2% from the previous year).

Public Source of Prenatal Care Payment

The percentage of mothers whose source of payment for prenatal care was public **increased** between 2002 and 2003, **from 28.5% to 28.9%, continuing its steady increase since 1996.**

Mothers whose prenatal care source of payment was Medicaid were more likely to be very young mothers, to deliver LBW infants, to be unmarried, and likely to receive adequate prenatal care, to breastfeed, and to deliver by Cesarean section than mothers whose prenatal care was privately funded.

Multiple Births

In 2003, 95.3% of all births were singletons, 4.4% were twins (3,551 births) and 0.3% were triplets (241 births), and two sets of quadruplets. The total percentage of **multiple births (twins, triplets or more) was 4.7% in 2003, which was a slight decrease of 4% from 2002 (4.9%).** The percentage of multiples among births to mothers ages 35+ (7.1%) was almost double the percentage for mothers under age 35 (4.1%).

A Comparison of Massachusetts and U.S. Indicators

Most Massachusetts perinatal health indicators in 2003 were better than those for the U.S. in 2003.

According to preliminary U.S. birth statistics for 2003:

- The **birth rate** for women ages 15-44 in Massachusetts (56.2 births per 1,000 women 15-44 years) was **15% lower** than the U.S. birth rate (66.1).
- The **teen birth rate** in Massachusetts (22.6 births per 1,000 women ages 15-19) was **46% lower** than the U.S. teen birth rate (41.7).
- The **low birthweight** rate in Massachusetts (7.6%) was **3% lower** than the U.S. low birthweight rate (7.9%).
- The **preterm** rate in Massachusetts (8.7%) was **29% lower** than the U.S. preterm rate (12.3%).
- The **percentage of women receiving prenatal care in the first trimester** in Massachusetts (83.9%) **was slightly lower** than the U.S. percentage (84.1%).
- The **cesarean section delivery rate** in Massachusetts (29.3%) was **6% higher** than the U.S. c-section rate (27.6%).
- According to preliminary U.S. death statistics for 2003, the **infant mortality rate (IMR)** in Massachusetts (4.8) was **30% lower** than the U.S. IMR (6.9).

Birth Data Availability

Detailed information on 2003 births in Massachusetts is available on the Department's free, Internet-based public health information service, **MassCHIP**. To register as a user, visit the MassCHIP website at http://masschip.state.ma.us or call 1-888-MASCHIP (within MA only) or 617-624-5629.

This report is also available on the DPH website at: http://www.mass.gov/dph/pubstats.htm.

CHAPTER 1

BIRTH CHARACTERISTICS

Birth Numbers and Rates

In 2003, 80,167 births occurred to Massachusetts residents (Table 1). The number of resident live births in Massachusetts has decreased by 13% since 1990 when it was 92,461 births.

In 2003, the fertility rate was 56.2 births per 1,000 women ages 15-44 years. This rate remained the same as last year's, but the rate has decreased by 9% since 1990 when it was 62.1 (Table 1).

The Massachusetts fertility rate in 2003 was 15% below the preliminary U.S. rate of 66.1 per 1,000 women ages 15-44 (National Vital Statistics Reports, Vol. 53, No. 9, November 23, 2004, p. 2).

Distribution of Births by Race and Hispanic Ethnicity and Mother's Birthplace

In 2003, of all live births to Massachusetts residents, 71.9% (57,604) were to white non-Hispanic mothers; 12.2% (9,764) were to Hispanic mothers; 7.4% (5,902) were to black non-Hispanic mothers; 6.5% (5,224) were to Asian mothers; and 1.9% (1,548) were American Indian or "Other Race" (Table 2A). Race and Hispanic ethnicity are reported by the mothers themselves.

The proportion of white and black non-Hispanic births has decreased somewhat since 1990. At the same time, the proportion of Asians and Hispanic births has increased greatly. The percentage of all births to white non-Hispanic decreased by 8%, from 78.4% to 71.9% since 1990, and the percentage of all births to black non-Hispanic mothers decreased by 4%, from 7.7% to 7.4%. The percentage of all births to Asian mothers increased by 76%, from 3.7% to 6.5%. The percent of births to Hispanic mothers increased by 34%, from 9.1% to 12.2%.

In 2003, 26.6% of births in Massachusetts were to women born outside of the fifty United States, including 2.5% of births to women born in Puerto Rico and other U.S. Territories, and 24.1% of non-US-born mothers. White non-Hispanic mothers had the smallest percentage of births to non-US-born mothers at 10.6%. The percentage of births to non-US-born mothers was greater for other race and Hispanic ethnicity groups: 89.9% for Asian births; 48.9% for Hispanic births, and 47.4% for black non-Hispanic births. Among Hispanic births, 19.5% were to women born in Puerto Rico and other U.S. Territories. (Table 2A).

Emerging Populations

Despite a very small percent (less than 1%) decrease in overall births from 2002, certain groups have experienced large increases in the numbers of births. Births to five ethnicity groups have increased more than 10% since 2002: Japanese, Mexican, Cuban, Colombian, and Other Central American. Births to Other Central American mothers have increased by 22% since last year. Within this category, mothers born in Guatemala and Honduras had the largest increases (up 26%, and up 19%, respectively). Births to Colombian mothers have increased by 21% since last year, while births to Cuban and Mexican mothers have increased by 19% and 16%, respectively. Births to Japanese mothers increased by 12% from 180 births in 2002 to 201 in 2003.

Teen Births

In 2003, there were almost the same number of births to women ages 15-19 (teen births), 4,639 compared with 4,642 births for this age group in 2002 (Table 1). The number of teen births has been decreasing since 1990, with an overall decrease of 36% (7,258 teen births in 1990).

The teen birth rate (births per 1,000 women ages 15-19) was 22.6 in 2003, which was the same as in the previous year (Table 1). In contrast, the 2003 U.S. teen birth rate was 45.8 (National Vital Statistics Reports, Vol. 53, No. 9, November 23, 2004, p. 3), more than double the Massachusetts teen birth rate.

Statewide, in 2003, 1.9% of births were to women under age 18, and 5.9% were to women under the age of 20 (Table 2A). The highest percentage of births to women under 18 among racial and ethnic groups was for Hispanics (6.3%), followed by black non-Hispanics (3.4%), Asians (1.3%), and white non-Hispanics (1.0%) (Table 2A).

Among maternal ethnicity categories, Puerto Ricans and Cambodians had the highest teen birth percentages in 2003. For Puerto Rican women, 24.8% of births were to women under age 20 and 10.3% to women under age 18 (Table 2B). For Cambodians, these percentages were 18.8% and 7.8%, respectively.

Low Birthweight

In 2003, 7.6% of infants born to Massachusetts women were low birthweight (that is, they weighed less than 2,500 grams or 5.5 pounds) (Table 1). This percentage increased 1%, from 7.5% in 2002, making the 2003 the highest LBW percent since 1980[3].

In 2003, the low birthweight percent in Massachusetts was 4% below the national figure of 7.9%. The percentage of low birthweight births increased nationwide as well from 2002 to 2003, from 7.8% to 7.9%, which was the highest it had been in the U.S. in three decades (National Vital Statistics Reports, Vol. 53, No. 9, November 23, 2004, p. 2).

The percentage of low birthweight infants varied by mother's race and ethnicity. Black non-Hispanic mothers had the highest proportion of low birthweight infants (12.1%); followed by Hispanic mothers (8.3%); Asian mothers (8.1%); and white non-Hispanic mothers (7.0%) (Table 2A). The low birthweight percentage increased for white non-Hispanic infants by 3% from 2002 to 2003, for Asians by 1%, and remained the same for Hispanics. The percentage of low birthweight infants for black non-Hispanic mothers decreased by 4% from 12.6% in 2002 to 12.1% in 2003.

Among maternal ethnicity groups, the highest percentage of low birthweight infants in 2003 occurred among mothers who identified their ancestries as African-American (13.3%), Haitian (10.8%), Puerto Rican (10.1%), Cape Verdean (9.9%), Cambodian and Asian Indian (9.8%). The highest percentages of very low birthweight (VLBW) (less than 1,500 grams or 3.3 pounds), occurred among mothers who identified their ethnicity as African-American (3.0%), Other African, and Haitian (2.7%) (Table 2B).

[3] 1980 is the earliest year on which there is a recorded birthweight.

Prenatal Care

SPECIAL NOTE ON MEASURING ADEQUACY OF PRENATAL CARE: Beginning with *Massachusetts Births 2001*, adequacy of prenatal care is being measured by the Adequacy of Prenatal Care Utilization (APNCU) Index instead of the Kessner Index, which has been used in past reports. This improves upon the Kessner Index in various ways, the most important of which is the ability to distinguish between inadequate prenatal care due to the timing of initiation and inadequate care due to insufficient prenatal care visits.

Table 1 provides a comparison of values based on the two indices between 1996 and 2003. The values for the APNCU Index are consistently higher than those calculated with the Kessner Index (Table 1). Please see the Technical Appendix for more information on the change from the Kessner Index to the APNCU Index. Please note: adequacy of prenatal care is a measure of the timing and number of prenatal care visits, and does not reflect the quality of care.

In 2003, 84.5% of infants had mothers who received adequate prenatal care, which was a very slight decrease from 84.7% in 2002. The percentage of women receiving prenatal care during the first trimester of pregnancy also decreased slightly from 84.2% in 2002 to 83.9% (Table 2A).

The percentage of adequate prenatal care varied by mother's race and Hispanic ethnicity, ranging from a low of 76.1% for black non-Hispanic mothers to a high of 86.8% for white non-Hispanic mothers. The rates for Hispanic and Asian mothers were 78.5% and 81.9%, respectively (Table 2A). The percentage of adequate prenatal care increased only for black non-Hispanics, from 74.8% to 76.1% (a 2% increase), while it decreased slightly for white non-Hispanics and Hispanics from 2002 to 2003, and remained constant for Asians.

Adequacy of prenatal care also varied by maternal ancestry. Mothers reporting their ancestries as Chinese, European, and Other Portuguese (not Cape Verdean or Brazilian) were the groups most likely to receive adequate prenatal care – 89.0%, 87.5%, and 87.4%, respectively, while Cambodian and Cape Verdean mothers were least likely to receive adequate prenatal care – 62.8% and 69.4%, respectively (Table 2B).

Cesarean Section Deliveries

In 2003, the Cesarean section delivery rate rose for the sixth straight year to an all time high. In 2003, 29.3% of births to resident Massachusetts women were delivered by Cesarean section, which is a 4% increase over the 2002 percentage (28.1%), which also was an all time high (Table 2A). The Cesarean section percentage continues to increase: 6% from 1999 (22.4%) to 2000 (23.8%); 8% from 2000 to 2001 (25.6%), 10% from 2001 to 2002 (28.1%), and 4% in the last year. However, this year, the percentage of increase was lower than in other recent years. The Cesarean section rate in Massachusetts in 2003 was 6% higher than the nationwide rate of 27.6%. The nationwide rate for 2003 was also the highest ever recorded (National Vital Statistics Reports, Vol. 53, No. 9, November 24, 2004, p. 2).

The percentage of Cesarean sections increased in all racial and ethnic groups in the last year. Black non-Hispanic women had the highest percentage of Cesarean section deliveries 30.8%[4],

[4] Note that the category of black non-Hispanic mothers includes mothers who identified with several ancestries including Haitian, African-Americans and Other African. Mothers who identified as African-American for their ancestry had a Cesarean section rate of 28.4% and Haitian mothers had a Cesarean section rate of 33.9%.

and Hispanic women had the lowest percentage 25.8% (Table 2A). With regard to maternal ethnicity groups, the highest percentage of Cesarean section deliveries occurred to Brazilian women (38.0%) and the lowest percentage was among Cambodian women (16.3%) (Table 2B).

Breastfeeding

In 2003, 78.1% of Massachusetts mothers reported that they were breastfeeding or intending to breastfeed their infants (Table 2A). This represents a 38% increase since 1990 (56.6%).

The percentage of mothers breastfeeding differed by maternal race and Hispanic ethnicity, with the highest percentage reported among Asians (82.1%) and the lowest among white non-Hispanics (77.0%) (Table 2A). There was more variation among mothers of different self-identified ancestry groups. The highest rates of breastfeeding were among Asian Indians (96.7%), Brazilians (94.5%), and Salvadorans (94.3%) (Table 2B). In contrast, only 50.4% of women identifying as Cambodians and 49.2% of "Other Portuguese" reported that they were breastfeeding or intending to breastfeed their infants.

The percentage of mothers breastfeeding or intending to breastfeed increased as mother's age increased. For teens 15-19, the percentage was 63.6%, while for women ages 45 and above the percentage was 90.9% (Figure 2).

Birth Characteristics in the 30 Largest Massachusetts Cities and Towns

In 2003, among live births to residents of the 30 largest municipalities (see Table 3A for the list of communities) in the Commonwealth:

- The crude birth rates (number of births per 1,000 residents) were highest in Lawrence (19.1), Lynn (16.8), Lowell (16.1), Springfield (15.9), and Brockton (15.8). The crude birth rates in these cities were 25% or more above the state level (12.6): 52% above in Lawrence, 33% in Lynn, and 26% in Brockton. Crude birth rates were the lowest in Newton (9.1) and Barnstable (9.8), which were below the state level by 38% and 29% respectively. (Table 3A).

- Seven communities (in descending order with percentages above statewide average in parenthesis): Peabody (50%), Lowell (38%), Brockton (34%), New Bedford (32%), Methuen (29%), Fall River (29%), and Springfield (25%) recorded low birthweight percentages that were at least 25% higher than the statewide average of 7.6% (Table 3A). Low birthweight percentages were lowest in Arlington and Haverhill (5.9% and 5.5%, respectively).

- Over 90% of mothers living in Brookline, Arlington, Weymouth, Newton, and Quincy received adequate prenatal care. In contrast, fewer than 70% of mothers living in Pittsfield (59.8%) and Lowell (67.8%) received adequate prenatal care (Table 3A).

- The birth rate for teens was highest in Lawrence (82.9 births per 1,000 females ages 15 to 19 years) and in Springfield (79.3) (Table 3A). Both of these communities experienced increases in their teen birth rates in 2003 from the previous year. The Lawrence rate was almost 4 times the state rate of 22.6, and the Springfield rate was 3.5 times the state rate.

- Three communities had 2003 infant mortality rates (IMR) in excess of 10 deaths per 1,000 live births: Lowell (11.8), Barnstable (10.7), and Arlington (10.7). Infant mortality rates should be interpreted with caution in these communities since they are based on a small number of infant deaths (Lowell: 20, Barnstable: 5, and Arlington: 6) (Table 3A).

- Based on a three-year infant mortality rate (IMR) from 2001-2003, the communities with the highest IMRs were: Lowell (9.0), Taunton (8.3), New Bedford (8.1), and Lawrence (7.6) (Table 3A).

Birth Characteristics in Community Health Network Areas

In 2003, among resident live births in the 27 Massachusetts Community Health Network Areas (CHNAs):

- Four CHNAs had crude birth rates of 14 births or more per 1,000 residents. They were: Community Wellness Coalition (Worcester) (14), Community Health Network of Greater Metro West (Framingham) (14), Community Partners for Health (Milford) (14.3), and Greater Lawrence Community Health Network (15.0) (Table 3B).

- More than 8.8% of resident births in four CHNAs were low birthweight -- The Community Health Connection (Springfield) (8.9%), Greater Lowell Community Health Network (8.9%), and, Partners for a Healthier Community (Fall River) (9.6%). These percentages were 15% or more higher than the statewide average of 7.6% (Table 3B).

- Less than 70% of mothers received adequate prenatal care in the Community Health Network of Berkshire County (69.8%), while over 90% of mothers living within the Blue Hills Community Health Alliance (Greater Quincy) (90.3%), Greater Haverhill Community Health Network (90.5%), and Community Health Network North (Beverly/Gloucester) (94.1%) received adequate prenatal care (Table 3B).

- Teen birth rates among the Community Health Connection (Springfield) (51.1), the Greater Lawrence Community Health Network (44.2), Partners for a Healthier Community (Fall River) (42.1), Four (For) Communities (Holyoke, Chicopee, Ludlow, Westfield) (40.1), and, the Greater New Bedford Health & Human Services Coalition (34.6) were the highest in the state, ranging from more than double the statewide teen birth rate in Community Health Connection (Springfield) to one- and one-half times the state teen birth rate in the Greater New Bedford Health & Human Services Coalition. Teen birth rates were less than one-fourth the statewide average for West Suburban Health Network (Newton/Waltham) (4.0) and the Greater Woburn/ Concord/ Littleton Community Health Network (5.4) (Table 3B).

- The Community Health Network of Southern Worcester County CHNA had the highest infant mortality rate in 2003 among CHNAs: 7.6 deaths per 1,000 live births. Because of the relatively small number of infant deaths, mortality rates in individual CHNAs should be interpreted with caution (Table 3B).

Tobacco Use

In 2003, 7.7% of births were to mothers who reported smoking cigarettes during their pregnancies (Figure 3). This represents a 60% decline from 1990 (19.3%), and a decline of 3% from 2002 (7.9%).

Smoking prevalence during pregnancy differed by mother's race and Hispanic ethnicity. White non-Hispanic women had the highest prevalence of smoking during pregnancy (8.6%), followed by black non-Hispanic women (6.5%), Hispanic women (5.9%), and, finally, Asian women (1.4%) (Figure 3). The percentage of mothers who smoked during pregnancy decreased for all racial and ethnic groups, with black non-Hispanics and Hispanics experiencing the largest declines: 10% and 6%, respectively.

The prevalence of smoking during pregnancy generally decreased with higher maternal education; over 20% of mothers with less than a high school education smoked during pregnancy, compared with less than 1% of women with post-college education (Figure 3). This pattern was the same for white non-Hispanic women, black non-Hispanic women, and Hispanic women.

The majority (85.8%) of women who gave birth in 2003 were non-smokers prior to pregnancy, and 99.9% of them continued to abstain from smoking during pregnancy (Figure 4). (Fifty-three women started smoking during pregnancy.) Out of the14% of women who smoked prior to pregnancy, 53.6% were "light" smokers (1-10 cigarettes daily); 40.8% were "moderate" smokers (11-20 cigarettes daily); and 5.6% were "heavy" smokers (21 or more cigarettes daily). Almost half (46.7%) of pre-pregnancy smokers quit smoking during pregnancy.

Patterns in Number and Rate of Births by Age Group

There has been a marked change in the age distribution of Massachusetts resident mothers since 1980. Approximately 25% of women giving birth in 1980 were ages 30 years and compared with 56% in 2003. Beginning in 1996, the number of births to mothers aged 30 years and older exceeded the number of births to mothers under age 30. This trend has continued through 2003 (Figure 1).

In Massachusetts, the fertility rate (births to women ages 15-44 years per 1,000 women ages 15-44) decreased 9.6% from 1990 (62.2) to 2003 (56.2) (Table 4). In 2003, the age-specific birth rates were highest for 30-34 year old (107.2 per 1,000) and 25-29 year old mothers (83.6 per 1,000).

Since 1990, birth rates have increased for every 5-year age group of women ages 30 and above and decreased for every 5-year age group of women under 30 (Table 4). The largest birth rate increases have been for mothers in the age groups of women over 30, while the largest decreases have been among the youngest age groups, 15-19 and 12-14 (Table 4).

In 2003, there were 56 births to mothers ages 12-14 years (a decrease of 17 births from 2002) and there were 159 births to women 45 years of age or older (a decrease of 16 births from 2002) (Table 4).

Plurality

Plurality is the number of births in one delivery. In 2003, 95.3% (76,367 births) of all births were singletons, 4.4% were twins (3,551 births) and 0.3% were triplets (241 births), and two were quadruplets. The total percentage of multiple births (twins, triplets or more) was 4.7% in 2003,

which was a decrease of 4% from 2002 (4.9%) (Table 6). This decline is a reversal of the constant increases in multiples since 1990.

The percentage of multiple births has increased by 81% since 1990 (2.6%) and this increase varies by age. For women under 35 years, the percentage of multiple births increased from 2.5% in 1990 to 4.1% in 2003, an increase of 64%. The percentage of multiple births to women ages 35 years and older increased from 3.5% in 1990 to 7.1% in 2003, which was an increase of 103% (Table 6). Almost all of the 2003 decrease in multiples occurred to women 35 years and older. There was a net increase of 1 birth among multiples for women less than 35 (10 more twins and 9 fewer triplets).

Education

In 2003, 9.9% of women who gave birth had less than a high school education; 24.7% had a high school diploma or GED; 22.4% had some college education; and 43.0% had a college degree or more (Table 7).

Maternal educational attainment varied by race and Hispanic ethnicity; 53.9% of Asian women and 50.5% of white non-Hispanic women had at least a college degree, compared with 18.6% of black non-Hispanic women and 10.3% of Hispanic women (Table 7).

Women with more education were more likely to receive adequate prenatal care; more likely to breastfeed; more likely to have multiple births; and more likely to be married. These mothers were less likely to smoke during pregnancy and less likely to receive publicly financed prenatal care (Table 7).

Interpregnancy Intervals

The interpregnancy interval (IPI) is defined as the time (in months) between the initiation of the current pregnancy and the completion of the previous pregnancy. Research has shown that infants conceived with both a shorter and longer than an "optimal range"[5] of interpregnancy intervals (IPI) are more likely to have a higher risk of adverse perinatal outcomes.

The Massachusetts IPIs[6] derived from 2003 birth records conform to the findings mentioned above, that is, both a short[7] IPI (less than 12 months) and an IPI over 35 months were associated with higher proportions of low birthweight and premature deliveries; whereas, an IPI between 12 to 35 months was associated with lower proportions of low birthweight and premature deliveries (Table 8A and Figure 5A).

In 2003, 42,329 (out of 80,167 total, 52.8%) Massachusetts resident mothers delivered their second or higher order live infant. One percent were teen mothers, 69% were 20 to 34 years

[5] "Optimal range" of interpregnancy interval is the range in which adverse perinatal outcomes are minimized in the population such as the percentages of low birthweight and premature deliveries.
[6] For each mother delivering her 2nd or higher order live infant in 2003, the IPI was derived by calculating the months between the date of last menstrual period of current pregnancy and the date of birth of last live birth. Mothers delivering multiples were included only once.
[7] Short IPI is defined variously in the literature, including values 'less than 6', 'less than 12', and 'less than 18' months. In this report 12 months is used.

old, and 29% were aged 35 and older (Table 8B). Mothers having a subsequent pregnancy[8] while they are still teens represent 13.5% of all teens giving birth in 2003 (632 out of 4,695 teen mothers in 2003).

Among mothers having a subsequent pregnancy (yielding a live birth in 2003), teen pregnancies were 3.7 times as likely to have been initiated within 12 months after the previous birth as compared with mothers 35 years and older (43% vs. 12%, Table 8B). Among race and Hispanic ethnicity groups, subsequent pregnancies to black non-Hispanic mothers were the most likely to have been initiated 36 months or later after the previous live birth (53%, compared with 33% among white non-Hispanics, Table 8B).

In Figure 5B, the IPIs are shown for three age groups: less than 20, 20-34, and 35+. About 4 out of 10 teen mothers' subsequent pregnancies were initiated within 12 months after the previous birth, while about 2 out of 10 mothers aged 20 to 34, and about 1 out of 10 mothers aged 35 and older were initiated within 12 months after previous birth (Figure 5B).

Short Interpregnancy Interval (less than 12 months)

Sixteen percent of all subsequent pregnancies in Massachusetts were initiated within 12 months after delivery of the previous child; that is, within a short interpregnancy interval (IPI). The proportion of mothers with ***short IPI,*** increased slightly with increasing education. This proportion varied little by the source of payment for their delivery care (public or private). Mothers living in the Boston (16.7%) and the Western Executive Office of Health and Human Services (EOHHS) region (16.6%) had the highest proportion of short IPI. Those living in the communities of Billerica (21%), Weymouth (21%) and Holyoke (21%) were the most likely to have had a short IPI.

Interpregnancy Interval: 12 to 35 Months

Forty-six percent of the current subsequent pregnancies were initiated between 12 to 35 months after the previous delivery. This proportion increased more rapidly with increased maternal education (37% for mothers with high school education or less, 49% for mothers with a college degree or some college education, and 60% for those with more than college education, Table 8B). White non-Hispanics were 1.5 times as likely to have begun the subsequent pregnancy between 12 to 35 months after the previous birth, as compared with Black non-Hispanics (50% vs. 33%). Among mothers delivering their subsequent child, those having private funds to pay for delivery care were 1.4 times more likely to have begun their subsequent pregnancy between 12 to 35 months later than mothers with public funding for their delivery care (36% vs. 50%) (Table 8B).

Mothers living in the Metrowest EOHHS region were 1.4 times as likely to have begun their pregnancy between 12 to 35 months after previous birth as those living in the Boston EOHHS region (53% vs. 38%). Mothers in the communities of Needham (69%), Wellesley (61%), and Arlington (58%) were the most likely to have begun their pregnancy between 12 to 35 months after the previous birth (Table 8B).

Interpregnancy Interval: 36 Months or More

[8] The term "subsequent pregnancy" refers to a 2nd or higher pregnancy.

Thirty-eight percent of all subsequent pregnancies in 2003 were initiated 36 months or more after the delivery of the previous child. This proportion decreased with increasing maternal education (48% for mothers with high school education or less, 36% for mothers with a college degree or some college education, and 23% for those with more than college education, Table 8B). Also, mothers with public funding for delivery care were 1.4 times more likely to have begun their current pregnancy 36 months or later, after previous birth than mothers with private funding (48% vs. 34%).

Mothers living in the Boston EOHHS region were the most likely to have had their subsequent pregnancy initiated 36 months and after (47%); whereas, those living in the Metrowest EOHHS region were the least likely (31%). Mothers in the communities of Chelsea (60%), Revere (52%), and Lynn (50%) mothers were the most likely to have begun their subsequent pregnancies 36 months or more after delivering the previous child (Table 8B).

Healthy People 2010 Objectives

Healthy People 2010 (HP2010) sets targets for each measurable objective[8]. Table 9 presents the most recent Massachusetts data for HP2010 Maternal, Infant, and Child Health objectives and measures the state's progress toward meeting the targets set for 2010.

Out of 16 objectives presented, Massachusetts has already met the 2010 target for two indicators: the postneonatal mortality rate and breastfeeding. For nine objectives, the 2002 Massachusetts indicators are within 25% of the target goals: infant mortality rate, fetal mortality rate, neonatal mortality rate, perinatal mortality rate, preterm birth, early and adequate prenatal care, prenatal care beginning in the first trimester, very low birthweight infants born at Level III hospitals, and smoking during pregnancy. For five objectives, Massachusetts is still more than 25% away from achieving the targets: maternal mortality ratio, low birthweight, very low birthweight, and Cesarean sections (both low-risk women giving birth for the first time and for low-risk women with prior Cesarean section).

[8] U.S. Department of Health and Human Services. Tracking Healthy People 2010. Washington, DC: U.S. Government Printing Office, November 2000.

Table 1. Trends in Birth Characteristics, Massachusetts: 1980, 1990-2003

Characteristic		1980	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Births[1]	**n**[2]	72,591	92,461	88,176	87,202	84,627	83,758	81,562	80,164	80,321	81,406	80,866	81,582	81,014	80,624	80,167
	Rate[3]	53.4	62.1	59.4	59.1	57.6	57.0	55.5	54.6	54.7	55.6	55.9	57.2	56.8	56.5	56.2
Race of Mother																
White[4]	**n**	66,220	80,775	76,983	76,052	73,704	72,980	71,083	69,485	69,503	70,452	69,305	69,371	68,728	67,874	67,586
	%[5]	91.2	87.4	87.3	87.2	87.1	87.1	87.2	86.7	86.5	86.5	85.7	85.0	84.8	84.2	84.3
Black	**n**	4,626	7,729	7,352	7,203	6,916	6,713	6,299	5,946	6,182	6,337	6,524	6,445	6,555	6,649	6,561
	%[5]	6.4	8.3	8.3	8.3	8.2	8.0	7.7	7.4	7.7	7.8	8.1	7.9	8.1	8.2	8.2
Asian/Other[6]	**n**	1,069	3,688	3,566	3,582	3,664	3,790	3,817	3,950	4,217	4,248	4,615	5,205	5,279	5,793	5,688
	%[5]	1.5	4.0	4.0	4.1	4.3	4.5	4.7	4.9	5.3	5.2	5.7	6.4	6.5	7.2	7.1
Unknown	**n**	676	269	275	365	343	275	363	783	419	369	422	561	452	308	332
	%[5]	0.9	0.3	0.3	0.4	0.4	0.3	0.4	1.0	0.5	0.5	0.5	0.7	0.6	0.4	0.4
Teen Births (Ages 15-19)	**n**	7,694	7,258	6,892	6,555	6,469	6,412	5,990	5,758	5,801	5,823	5,515	5,305	4,979	4,642	4,639
	Rate[3]	28.1	35.4	35.4	34.5	34.0	33.2	30.3	28.5	28.5	28.1	26.7	25.8	24.3	22.6	22.6
Births to Unmarried Mothers	**n**	11,356	22,837	22,852	22,612	22,345	22,302	20,857	20,253	20,640	21,191	21,448	21,621	21,620	21,604	22,262
	%	15.6	24.7	25.9	25.9	26.4	26.6	25.6	25.3	25.7	26.0	26.5	26.5	26.7	26.8	27.8
Low Birthweight	**n**	4,413	5,388	5,199	5,137	5,202	5,335	5,174	5,105	5,617	5,655	5,708	5,711	5,795	6,060	6,115
	%	6.1	5.8	5.9	5.9	6.2	6.4	6.4	6.4	7.0	7.0	7.1	7.1	7.2	7.5	7.6
Preterm	**n**	6,732	6,313	6,492	6,438	5,705	5,831	6,117	6,136	5,831	6,117	6,136	6,582	6,412	6,795	6,963
	%	7.4	7.3	7.8	7.9	7.2	7.3	7.6	7.6	7.3	7.6	7.6	8.3	8.0	8.5	8.7
Adequate Prenatal Care																
Kessner Index[7]	**%**	82.0	80.1	81.6	82.9	83.8	84.3	84.2	79.9	80.0	79.8	79.4	79.1	80.4	79.9	79.9
APNCU Index[8]	**%**								83.3	82.9	82.9	82.9	83.3	85.2	84.7	84.5

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Births presented in all tables are resident live births unless otherwise specified. 2. Differences in numbers of births from previous publications are the result of updated files. 3. Birth rates represent the total number of births to women ages 15-44 years per 1,000 females ages 15-44; teen birth rates refer to number of births per 1,000 women age 15-19. 2000-2003 birth rates are calculated using DPH 2000 population estimates, based on U.S. Census 2000 population counts. 1999 rates are calculated using the 1999 DPH Massachusetts population estimates (see Technical Notes in Appendix). PLEASE NOTE: DIFFERENCES BETWEEN THESE RATES AND PREVIOUSLY PUBLISHED DATA REFLECT UPDATES IN POPULATION ESTIMATES. 4. On tables and graphs that include data prior to June 1986, the race classifications do not include an ethnicity component; most Hispanics are included in the race category of white. 5. Percentages are calculated based on all births, including those to mothers of unknown race. 6. Other races include American Indian and others not specified. 7. Adequacy of prenatal care in Massachusetts has historically been measured with the Kessner Index, based on the timing of care and number of visits. This measure is calculated based on only those births with known adequacy of prenatal care. Changes in the calculation of the Kessner Index in 1996, as well as computational adjustments made for 1996-2000 data, make data prior to 1996 non-comparable to data from 1996 onward. 8. Beginning with last year's publication, the APNCU Index has replaced the Kessner Index as the standard measurement of adequacy of prenatal care (see Technical Notes for more information).

Table 2A. Birth Characteristics by Maternal Race and Hispanic Ethnicity and Birthplace, Massachusetts: 2003

Race and Hispanic Ethnicity (by mother's birthplace)	Births		Teen Births				Birthweight				Prenatal Care				Cesarean Section		Breastfeeding[5]	
			<18 Years		<20 Years		Very Low[2]		Low[3]		Adequate[4]		First Trimester					
	n	%[1]	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
State Total	**80,167**	**100.0**	**1,529**	**1.9**	**4,695**	**5.9**	**1,115**	**1.4**	**6,115**	**7.6**	**67,173**	**84.5**	**66,789**	**83.9**	**23,392**	**29.3**	**61,388**	**78.1**
U.S. States / D.C.	58,744	73.3	1,170	2.0	3,572	6.1	833	1.4	4,493	7.7	50,058	85.9	50,272	86.1	17,215	29.5	42,971	74.9
Puerto Rico/U.S. Terr.[7]	1,983	2.5	159	8.0	398	20.1	34	1.7	201	10.2	1,546	79.0	1,542	78.6	535	27.2	1,412	72.3
Non-U.S.-Born[8]	19,357	24.1	198	1.0	721	3.7	238	1.2	1,401	7.3	15,516	80.9	14,917	77.6	5,618	29.2	17,004	88.3
White non-Hispanic	**57,604**	**71.9**	**593**	**1.0**	**2,223**	**3.9**	**714**	**1.2**	**4,038**	**7.0**	**49,704**	**86.8**	**49,980**	**87.2**	**17,235**	**30.1**	**43,338**	**77.0**
U.S. States / D.C.	51,389	89.2	559	1.1	2,093	4.1	655	1.3	3,665	7.1	44,444	87.0	44,826	87.6	15,360	30.0	37,859	75.5
Puerto Rico/U.S. Terr.[7]	49	0.1	3	--[6]	6	--[6]	2	--[6]	4	--[6]	47	95.9	46	93.9	10	20.4	33	76.7
Non-U.S.-Born[8]	6,110	10.6	30	0.5	122	2.0	51	0.8	357	5.9	5,172	85.2	5,063	83.4	1,851	30.4	5,445	89.7
Black non-Hispanic	**5,902**	**7.4**	**201**	**3.4**	**557**	**9.4**	**185**	**3.1**	**715**	**12.1**	**4,405**	**76.1**	**4,195**	**71.9**	**1,808**	**30.8**	**4,644**	**79.5**
U.S. States / D.C.	3,077	52.1	171	5.6	467	15.2	108	3.5	423	13.8	2,346	77.7	2,252	74.1	868	28.4	2,144	70.8
Puerto Rico/U.S. Terr.[7]	22	0.4	0	0.0	0	0.0	0	0.0	5	22.7	16	72.7	16	72.7	5	22.7	17	77.3
Non-U.S.-Born[8]	2,797	47.4	30	1.1	89	3.2	76	2.7	285	10.2	2,038	74.2	1,922	69.5	933	33.4	2,483	89.2
Hispanic	**9,764**	**12.2**	**619**	**6.3**	**1,581**	**16.2**	**128**	**1.3**	**805**	**8.3**	**7,581**	**78.5**	**7,358**	**76.0**	**2,507**	**25.8**	**7,840**	**80.8**
U.S. States / D.C.	3,080	31.5	353	11.5	814	26.4	47	1.5	299	9.7	2,380	78.2	2,319	75.9	718	23.5	2,095	68.5
Puerto Rico/U.S. Terr.[7]	1,906	19.5	156	8.2	392	20.6	32	1.7	191	10.0	1,480	78.7	1,477	78.4	519	27.5	1,358	72.1
Non-U.S.-Born[8]	4,778	48.9	110	2.3	375	7.8	49	1.0	315	6.6	3,721	78.5	3,562	75.1	1,270	26.7	4,387	92.1
Asian	**5,224**	**6.5**	**69**	**1.3**	**182**	**3.5**	**60**	**1.2**	**421**	**8.1**	**4,253**	**81.9**	**4,044**	**77.9**	**1,386**	**26.6**	**4,266**	**82.1**
U.S. States / D.C.	513	9.8	56	10.9	102	19.9	11	2.2	43	8.4	394	77.4	384	75.4	106	20.8	423	83.4
Puerto Rico/U.S. Terr.[7]	4	--[6]	0	0.0	0	0.0	0	0.0	1	--[6]	2	--[6]	2	--[6]	1	--[6]	4	--[6]
Non-U.S.-Born[8]	4,694	89.9	12	0.3	79	1.7	47	1.0	375	8.0	3,851	82.5	3,651	78.1	1,275	27.2	3,839	82.0
Other[9]	**1,548**	**1.9**	**45**	**2.9**	**146**	**9.4**	**24**	**1.6**	**126**	**8.2**	**1,178**	**76.7**	**1,158**	**75.2**	**432**	**28.1**	**1,259**	**82.8**
U.S. States / D.C.	591	38.2	29	4.9	90	15.2	10	1.7	57	9.7	452	77.3	449	76.4	146	25.0	419	72.1
Puerto Rico/U.S. Terr.[7]	2	--[6]	0	0.0	0	0.0	0	0.0	0	0.0	1	--[6]	1	--[6]	0	0.0	0	0.0
Non-U.S.-Born[8]	953	61.6	16	1.7	56	5.9	14	1.5	68	7.1	724	76.5	707	74.7	286	30.0	840	89.6
Unknown[10]	**125**	**0.2**	**2**	--[6]	**6**	**4.8**	**4**	--[6]	**10**	**13.2**	**52**	**78.8**	**54**	**81.8**	**24**	**32.4**	**41**	**68.3**

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. This column "Births %", the percentages of the race/Hispanic groups (bolded) are based on the state total (including births of unknown race/ethnicity), and the birthplace percents for the race/ethnicities are based on the total number in race/Hispanic ethnicity category. For all other categories, percentages are based on row totals. 2. Very low birthweight: less than 1,500 grams or 3.3 pounds. 3. Low birthweight: less than 2,500 grams or 5.5 pounds. 4. Beginning with last year's publication, the Adequacy of Prenatal Care Utilization Index has replaced the Kessner Index as the measure of adequate prenatal care. 5. Mother was breastfeeding or was intending to breastfeed at the time the birth certificate was completed. 6. Calculations based on fewer than five events are excluded. 7. The category "Puerto Rico/U.S. Territories" includes women born in Puerto Rico, the U.S. Virgin Islands, and Guam. Approximately 95% of the births in this category were to women born in Puerto Rico. 8. The category "Non-U.S.-Born" includes women born outside of the 50 U.S. states, District of Columbia, and Puerto Rico/U.S. territories. 9. Other: Mothers who designated themselves as American Indian or Other race. 10. Unknown: Mothers who did not indicate a race/ethnicity.

Table 2B. Birth Characteristics by Maternal Ethnicity, Massachusetts: 2003

Maternal Ancestry	Births[1]		Teen Births				Birthweight				Prenatal Care				Cesarean Section		Breastfeeding[5]	
			<18 Years		<20 Years		Very Low[2]		Low[3]		Adequate[4]		1st Trimester					
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
State Total	**80,167**	**100.0**	**1,529**	**1.9**	**4,695**	**5.9**	**1,115**	**1.4**	**6,115**	**7.6**	**67,173**	**84.5**	**66,789**	**83.9**	**23,392**	**29.3**	**61,388**	**78.1**
American	36,818	45.9	463	1.3	1,694	4.6	492	1.3	2,720	7.4	31,745	86.6	32,214	87.8	10,828	29.6	27,381	74.6
European	14,700	18.3	63	0.4	258	1.8	122	0.8	868	5.9	12,791	87.5	12,701	86.7	4,485	30.6	12,107	83.4
Puerto Rican	4,318	5.4	445	10.3	1,069	24.8	73	1.7	434	10.1	3,323	78.0	3,284	76.8	1,100	25.7	2,912	68.1
African-American	2,689	3.4	142	5.3	398	14.8	81	3.0	357	13.3	2,040	77.4	1,990	75.0	758	28.4	1,895	71.0
Dominican	1,852	2.3	83	4.5	218	11.8	22	1.2	112	6.1	1,505	81.5	1,471	79.7	511	27.7	1,621	87.6
Brazilian	1,655	2.1	29	1.8	80	4.8	15	0.9	91	5.5	1,391	84.9	1,327	81.0	624	38.0	1,556	94.5
Other Portuguese[6]	1,412	1.8	31	2.2	119	8.4	9	0.6	84	6.0	1,225	87.4	1,198	85.5	435	31.0	691	49.2
Chinese	1,356	1.7	4	0.3	11	0.8	11	0.8	77	5.7	1,203	89.0	1,117	82.6	381	28.1	1,151	85.1
Asian Indian	1,175	1.5	0	0.0	5	0.4	13	1.1	115	9.8	980	83.6	978	83.4	391	33.4	1,130	96.7
Haitian	1,145	1.4	14	1.2	42	3.7	31	2.7	123	10.8	814	73.1	749	66.4	388	33.9	999	87.4
Other Central American[6]	1,023	1.3	23	2.2	94	9.2	9	0.9	71	6.9	762	75.1	686	67.6	257	25.2	948	93.0
Other African[6]	901	1.1	5	0.6	16	1.8	21	2.3	70	7.8	655	73.3	621	69.4	298	33.1	835	92.8
Vietnamese	879	1.1	7	0.8	23	2.6	13	1.5	71	8.1	713	81.8	687	78.6	195	22.3	583	66.4
Salvadoran	833	1.0	33	4.0	81	9.7	5	0.6	65	7.9	608	74.3	575	70.0	162	19.6	783	94.3
Cape Verdean	788	1.0	27	3.4	92	11.7	17	2.2	78	9.9	541	69.4	515	65.9	190	24.3	621	79.2
Cambodian	565	0.7	44	7.8	106	18.8	10	1.8	55	9.8	353	62.8	304	54.0	92	16.3	284	50.4
Other South American[6]	537	0.7	8	1.5	33	6.1	7	1.3	33	6.2	424	79.7	418	78.6	170	31.9	493	92.5
Mexican	496	0.6	9	1.8	37	7.5	4	0.8	32	6.5	375	75.8	366	73.9	123	24.9	446	90.5
Colombian	454	0.6	6	1.3	25	5.5	4	0.9	34	7.5	376	83.9	356	79.1	137	30.6	428	94.5
Other Middle Eastern[6]	425	0.5	1	0.2	6	1.4	5	1.2	24	5.6	336	79.6	350	82.9	116	27.5	395	93.6
Other and Missing[7]	6,146	7.7	92	1.5	288	4.7	151	2.5	601	9.9	5,013	84.1	4,882	81.4	1,751	28.8	4,129	82.4

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. In the first category, "Births", percentages are based on column total (state total of births, including births for which maternal ethnicity is unknown and other). For all other categories, percentages are based on row totals. 2. Very low birthweight: less than 1,500 grams or 3.3 pounds. 3. Low birthweight: less than 2,500 grams or 5.5 pounds. 4. The Adequacy of Prenatal Care Utilization Index has replaced the Kessner Index as the measure of adequate prenatal care. 5. Mother was breastfeeding or was intending to breastfeed at the time the birth certificate was completed. 6. "Other" refers to groups not specified on the parents' worksheet. See the Glossary entry "ethnicity" for the complete list of ethnicities. 7. This group includes other ethnicities specified that had fewer than 400 births, missing ethnicity, and "Other Ethnicity".

Table 3A. Resident Birth Characteristics, 30 Largest Municipalities[1], Massachusetts: 2003

Municipality	Rank (by pop. size)	Population	Crude Birth Rate[2]	Mother's Race and Ethnicity				Very Low Birthweight (<1500 g)	Low Birthweight (<2500 g)
				White non-Hispanic	Black non-Hispanic	Hispanic	Asian or Other[4]		
				%[3]	%[3]	%[3]	%[3]	%	%
STATE TOTAL		**6,349,097**	**12.6**	**71.9**	**7.4**	**12.2**	**8.4**	**1.4**	**7.6**
Arlington	29	42,389	13.2	82.0	2.1	3.4	12.5	1.1	5.9
Attleboro	30	42,068	14.8	82.0	3.2	7.1	7.7	--[5]	7.4
Barnstable	25	47,821	9.8	83.7	2.6	4.1	9.6	1.3	6.6
Boston	1	589,141	13.3	37.2	28.8	22.3	11.5	1.8	9.0
Brockton	6	94,304	15.8	41.1	34.4	7.8	16.3	1.6	10.2
Brookline	17	57,107	12.1	73.7	2.2	5.2	19.0	0.9	7.4
Cambridge	5	101,355	10.6	55.9	17.0	9.0	17.7	1.0	6.8
Chicopee	21	54,653	11.0	79.2	2.2	15.7	2.8	1.2	6.8
Fall River	8	91,938	13.7	80.6	6.3	7.8	5.2	1.7	9.8
Framingham	14	66,910	14.9	67.3	5.1	14.8	12.8	1.0	6.9
Haverhill	16	58,969	15.2	80.0	2.7	13.8	3.5	--[5]	5.5
Lawrence	13	72,043	19.1	16.5	2.4	77.0	3.9	1.6	8.5
Lowell	4	105,167	16.1	47.9	7.0	16.3	28.7	2.5	10.5
Lynn	9	89,050	16.8	41.2	10.5	38.2	10.2	1.3	7.0
Malden	18	56,340	14.2	53.1	13.2	8.2	25.3	1.0	7.5
Medford	20	55,765	10.5	76.0	10.1	3.8	10.1	1.2	8.1
Methuen	28	43,789	14.0	69.9	3.3	20.1	6.7	2.8	9.8
New Bedford	7	93,768	14.0	66.0	5.4	19.4	8.8	2.5	10.0
Newton	11	83,829	9.1	82.3	1.6	3.0	13.0	0.9	7.1
Peabody	24	48,129	10.9	86.1	0.9	8.2	4.6	2.3	11.4
Pittsfield	27	45,793	11.5	84.3	6.8	5.7	3.2	1.7	8.3
Plymouth	23	51,701	14.2	94.1	1.2	2.2	2.2	1.5	6.3
Quincy	10	88,025	13.4	64.5	5.3	2.7	27.0	1.1	6.4
Revere	26	47,283	14.9	56.7	6.4	25.9	11.0	1.1	7.3
Somerville	12	77,478	11.9	60.5	10.6	16.2	12.7	1.5	8.7
Springfield	3	152,082	15.9	30.4	21.3	43.6	4.7	1.6	9.5
Taunton	19	55,976	13.3	84.5	5.3	6.7	3.4	1.4	8.5
Waltham	15	59,226	12.4	56.7	8.4	20.2	14.7	1.8	8.6
Weymouth	22	53,988	13.5	89.0	1.9	2.1	6.2	2.2	8.3
Worcester	2	172,648	15.0	55.8	11.1	23.0	10.1	1.9	9.0

Table 3A.(cont'd) Resident Birth Characteristics, 30 Largest Municipalities[1], Massachusetts: 2003

Municipality	Birth					Deaths			
	Adequate Prenatal Care[6]	Public Payment[7] for Prenatal Care	Unmarried	Teen Mothers 15 to 19 years		Infant Mortality Rate[8]		Neonatal Mortality Rate[8]	
	%	%	%	n	Rate[2]	2003	2001-2003	2003	2001-2003
STATE TOTAL	**84.5**	**28.9**	**27.8**	**4,639**	**22.6**	**4.8**	**4.9**	**3.6**	**3.7**
Arlington	92.3	6.6	7.1	7	9.1	10.7	5.3	8.9	3.6
Attleboro	77.6	22.8	25.0	45	39.1	0.0	--[5]	0.0	--[5]
Barnstable	86.9	42.3	32.8	29	22.5	10.7	7.1	--[5]	4.3
Boston	84.6	45.6	43.1	573	25.8	6.1	6.9	4.7	5.2
Brockton	75.1	57.2	49.6	148	44.8	5.4	5.5	4.0	4.6
Brookline	93.3	6.3	4.5	1	--[5]	--[5]	3.6	--[5]	3.6
Cambridge	88.2	16.1	17.6	27	7.2	--[5]	4.4	--[5]	2.5
Chicopee	85.7	44.6	43.7	59	32.6	--[5]	5.5	--[5]	4.4
Fall River	85.4	59.8	54.1	163	55.9	5.5	6.5	4.0	6.0
Framingham	87.0	32.6	21.4	38	19.7	5.0	6.4	--[5]	5.4
Haverhill	88.6	27.2	31.0	53	29.6	--[5]	4.9	--[5]	4.2
Lawrence	84.2	61.4	61.8	236	82.9	5.8	7.6	5.1	5.6
Lowell	67.8	50.0	45.8	174	44.5	11.8	9.0	8.3	6.3
Lynn	76.9	58.2	48.8	145	48.5	8.7	6.8	5.3	5.0
Malden	86.4	33.9	24.5	29	20.8	--[5]	4.6	--[5]	2.9
Medford	89.5	22.6	17.3	15	8.6	--[5]	2.7	0.0	--[5]
Methuen	87.3	20.0	27.0	29	22.9	--[5]	--[5]	--[5]	--[5]
New Bedford	77.8	60.0	57.3	169	56.7	9.1	8.1	5.3	4.1
Newton	90.8	5.3	6.5	3	--[5]	--[5]	3.3	--[5]	2.5
Peabody	86.6	24.6	22.6	24	18.5	--[5]	5.6	--[5]	4.9
Pittsfield	59.8	46.1	47.8	72	52.9	--[5]	6.5	--[5]	3.2
Plymouth	80.4	17.4	21.7	28	17.8	6.8	4.7	6.8	3.3
Quincy	90.2	29.8	21.3	43	22.1	5.1	4.6	4.2	3.7
Revere	81.8	47.8	38.7	50	41.2	--[5]	4.4	--[5]	4.0
Somerville	84.2	35.0	30.7	46	22.0	--[5]	2.2	--[5]	1.9
Springfield	73.1	69.4	65.8	479	79.3	4.5	6.8	2.5	4.2
Taunton	80.1	36.3	36.3	58	35.1	--[5]	8.3	--[5]	7.0
Waltham	84.3	25.4	22.6	26	11.6	--[5]	4.8	--[5]	4.3
Weymouth	91.4	16.1	19.1	28	21.0	8.2	4.2	6.9	3.8
Worcester	73.1	44.0	43.6	263	38.0	4.3	7.1	3.1	5.3

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. The 30 largest municipalities are the cities and towns in Massachusetts with the largest populations according to DPH 2000 population estimates, based on U.S. Census 2000 population counts (see Technical Notes in Appendix). 2. Crude birth rates represent the number of births per 1,000 residents; teen birth rates refer to the number of births per 1,000 females ages 15-19. 2003 birth rates are calculated using the DPH 2000 population estimates. 3. For the category of Mother's Race and Ethnicity, percentages are calculated based on the state total of resident births, including births for which mother's race/Hispanic ethnicity is unknown. 4. Mothers who designated themselves as Asian, American Indian or Other. 5. Calculations based on fewer than 5 events are excluded. 6. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. Please see Glossary for definition. 7. Public payment sources include Commonhealth, Healthy Start, Medicaid/MassHealth, and Medicare (may be HMO or managed care), or free care. 8. Deaths per 1,000 live births. See Definitions of Rates section in Appendix for definitions of infant and neonatal mortality rates.

Table 3B: Resident Birth Characteristics, Community Health Network Areas (CHNAs), Massachusetts: 2003

CHNA	Population	Crude Birth Rate[1]	Mother's Race and Ethnicity: White non-Hispanic %[3]	Black non-Hispanic %[3]	Hispanic %[3]	Asian or Other[2] %[3]	Very Low Birthweight (<1500 g) %	Low Birthweight (<2500 g) %
STATE TOTAL	**6,349,097**	**12.6**	**71.9**	**7.4**	**12.2**	**8.4**	**1.4**	**7.6**
Community Health Network of Berkshire County	134,953	9.5	89.2	3.4	4.2	3.0	1.5	7.6
Upper Valley Health Web (Franklin County)	86,889	9.9	93.5	0.8	2.7	2.2	1.6	6.5
Partnership for Health in Hampshire County (Northampton)	150,077	8.5	86.4	1.6	5.9	5.9	0.6	6.0
The Community Health Connection (Springfield)	291,665	13.1	52.6	14.1	28.9	4.3	1.6	8.9
Community Health Network of Southern Worcester County	113,702	12.8	89.7	1.2	6.8	2.2	1.3	6.3
Community Partners for Health (Milford)	152,117	14.3	91.6	0.9	3.4	4.1	0.9	6.0
Community Health Network of Greater Metro West (Framingham)	374,478	14.0	83.4	1.7	5.6	9.2	1.3	7.0
Community Wellness Coalition (Worcester)	289,834	14.0	67.6	7.4	15.3	9.7	1.8	8.7
Fitchburg/Gardner Community Health Network	250,362	13.0	81.5	2.7	10.8	4.8	1.4	7.1
Greater Lowell Community Health Network	270,083	13.9	69.1	3.9	8.7	18.2	1.8	8.9
Greater Lawrence Community Health Network	182,025	15.0	47.4	2.1	44.2	6.3	1.7	8.1
Greater Haverhill Community Health Network	144,275	13.1	88.8	1.4	7.5	2.3	1.0	6.0
Community Health Network North (Beverly/Gloucester)	118,280	10.8	93.6	0.7	2.3	3.4	1.5	8.5
North Shore Community Health Network	278,839	13.1	67.8	5.3	20.6	6.2	1.3	8.0
Greater Woburn/Concord/Littleton Community Health Network	208,406	11.1	81.3	1.9	2.5	14.1	1.1	6.3
North Suburban Health Alliance (Medford/Malden/Melrose)	261,844	12.7	73.8	7.8	7.2	11.1	1.2	7.5
Greater Cambridge/Somerville Community Health Network	278,402	11.7	67.0	9.3	9.0	14.5	1.2	7.2
West Suburban Health Network (Newton/Waltham)	253,187	11.1	79.3	3.1	7.1	10.4	1.0	7.1
Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	746,914	13.5	40.5	23.6	24.3	11.5	1.6	8.5
Blue Hills Community Health Alliance (Greater Quincy)	365,457	12.9	77.7	6.3	2.3	13.3	1.6	7.5
Four (For) Communities (Holyoke, Chicopee, Ludlow, Westfield)	159,254	12.0	68.3	2.0	28.0	1.7	1.2	7.3
Greater Brockton Community Health Network	232,260	13.6	67.1	18.4	4.3	9.9	1.2	7.9
South Shore Community Partners in Prevention (Plymouth)	180,609	13.3	95.6	0.9	1.2	1.9	1.5	6.8
Greater Attleboro-Taunton Health & Education Response	242,659	13.3	88.7	2.9	3.5	4.7	1.1	7.4
Partners for a Healthier Community (Fall River)	140,256	12.0	84.8	5.0	5.9	4.1	1.6	9.6
Greater New Bedford Health & Human Services Coalition	195,533	11.9	77.1	3.9	11.9	6.8	1.8	8.2
Cape and Islands Community Health Network	246,737	9.4	86.7	3.3	3.9	5.9	1.1	5.7

Table 3B.(cont'd) Resident Birth Characteristics, Community Health Network Areas (CHNAs), Massachusetts: 2003

CHNA Number and CHNA	Births					Deaths			
	Adequate Prenatal Care[6]	Public Payment[7] for Prenatal Care	Unmarried	Teen Mothers 15 to 19 years		Infant Mortality Rate[8]		Neonatal Mortality Rate[8]	
	%	%	%	n	Rate[4]	2003	2001-2003	2003	2001-2003
STATE TOTAL	**84.5**	**28.9**	**27.8**	**4,639**	**22.6**	**4.8**	**4.9**	**3.6**	**3.7**
1. Community Health Network of Berkshire County	69.8	41.0	38.5	122	25.8	4.7	4.8	--[5]	2.9
2. Upper Valley Health Web (Franklin County)	86.8	34.0	33.5	68	23.7	--[5]	2.7	--[5]	2.3
3. Partnership for Health in Hampshire County (Northampton)	88.4	24.4	27.9	73	8.1	--[5]	4.2	--[5]	2.9
4. The Community Health Connection (Springfield)	78.5	53.5	49.0	537	51.1	6.0	6.5	3.9	4.2
5. Community Health Network of Southern Worcester County	83.5	26.7	31.2	100	27.3	7.6	5.9	4.8	4.0
6. Community Partners for Health (Milford)	88.0	11.5	13.5	65	14.4	2.8	5.3	--[5]	4.2
7. Community Health Network of Greater Metro West (Framingham)	87.1	14.2	11.8	108	10.9	3.8	4.4	3.2	3.8
8. Community Wellness Coalition (Worcester)	75.5	31.0	32.1	292	28.2	4.2	6.0	3.5	4.9
9. Fitchburg/Gardner Community Health Network	83.6	24.2	27.6	212	25.9	4.3	4.4	2.8	2.9
10. Greater Lowell Community Health Network	76.6	28.5	27.1	221	25.8	6.9	5.3	4.3	3.6
11. Greater Lawrence Community Health Network	86.1	37.0	39.1	273	43.7	4.8	5.0	3.3	3.6
12. Greater Haverhill Community Health Network	90.5	19.1	21.5	74	17.6	3.7	4.6	3.2	3.7
13. Community Health Network North (Beverly/Gloucester)	94.1	17.6	15.1	32	8.6	5.5	4.5	5.5	4.0
14. North Shore Community Health Network	82.5	35.9	30.9	220	26.5	6.8	4.9	4.6	3.7
15. Greater Woburn/Concord/Littleton Community Health Network	88.1	6.5	8.2	29	5.4	2.2	1.9	--[5]	1.4
16. North Suburban Health Alliance (Medford/Malden/Melrose)	88.8	22.5	18.3	99	14.3	4.2	3.4	3.0	2.4
17. Greater Cambridge/Somerville Community Health Network	88.3	18.2	17.6	86	10.9	3.7	4.1	3.4	2.8
18. West Suburban Health Network (Newton/Waltham)	88.8	9.9	10.1	39	4.0	3.9	3.0	3.2	2.5
19. Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	85.2	43.4	40.6	695	26.3	5.5	6.3	4.3	4.7
20. Blue Hills Community Health Alliance (Greater Quincy)	90.3	16.7	16.0	114	11.8	6.0	4.3	5.5	3.7
21. Four (For) Communities (Holyoke, Chicopee, Ludlow, Westfield)	84.1	48.5	44.5	236	40.1	3.1	5.1	--[5]	3.9
22. Greater Brockton Community Health Network	82.5	35.1	32.8	194	23.5	4.8	4.5	3.5	3.7
23. South Shore Community Partners in Prevention (Plymouth)	87.1	13.2	16.8	73	13.0	5.4	3.4	4.6	2.6
24.Greater Attleboro-Taunton Health & Education Response	82.1	22.1	22.3	163	21.4	2.5	4.6	2.2	4.0
25. Partners for a Healthier Community (Fall River)	87.5	52.3	46.4	187	42.1	4.8	6.3	3.6	5.7
26. Greater New Bedford Health & Human Services Coalition	78.1	44.1	43.6	226	34.6	6.9	6.7	4.3	3.6
27. Cape and Islands Community Health Network	84.5	31.8	26.1	101	16.4	6.1	5.8	4.3	4.0

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Births per 1,000 residents (male and female). 2003 birth rates are calculated using DPH 2000 population estimates, based on U.S. Census 2000 population counts (see Technical Notes in Appendix). 2. Mothers who designated themselves as Asian, American Indian or Other. 3. For the category of Mother's Race and Ethnicity, percentages are calculated based on the state total of resident births, including births for which mother's race/Hispanic ethnicity is unknown. 4. Births per 1,000 female residents ages 15-19. 5. Calculations based on fewer than 5 events are excluded. 6. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. Please see Glossary for definition. 7. Public payment sources include Commonhealth, Healthy Start, Medicaid/MassHealth, and Medicare (may be HMO or managed care), or free care. 8. Deaths per 1,000 live births. See Definitions of Rates section in Appendix for definitions of infant and neonatal mortality rates.

Table 4. Age-Specific and Crude Birth Rates, Massachusetts: 1990 and 2003

Mother's Age	1990 Births[1]	1990 Rate	2003 Births	2003 Rate[2]	Percent Change in Rate
12-14	124	1.3	56	0.4	-69.2
15-19	7,258	35.1	4,639	22.6	-35.6
20-24	18,115	69.5	11,894	57.9	-16.7
25-29	29,913	107.2	18,436	83.6	-22.0
30-34	25,687	93.9	26,829	107.2	14.2
35-39	9,795	40.1	14,889	54.3	35.4
40-44	1,522	6.9	3,260	12.2	76.8
45+[3]	46	0.3	159	0.7	133.3
Birth rate, ages 15-44[4]	92,290	62.2	79,947	56.2	-9.6
Crude Birth Rate[5]	92,461	15.4	80,167	12.6	-18.2

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Differences in the number of births from previous publications are the result of updating of the birth files. The number of births for all age groups does not always add to the total number of births as mother's age is sometimes not recorded on the birth certificate.
2. 2003 birth rates are calculated using DPH 2000 population estimates, based on U.S. Census 2000 population counts (see Technical Notes in Appendix). 3. Denominator is female population ages 45-49. 4. Rate represents the total number of births to women age 15-44 per 1,000 women age 15 to 44. 5. Births per 1,000 residents (male and female). Includes births to mothers of all age groups and mothers for whom age is unknown.

Figure 1. Trends in the Number of Births by Mother's Age Group, Massachusetts: 1980-2003

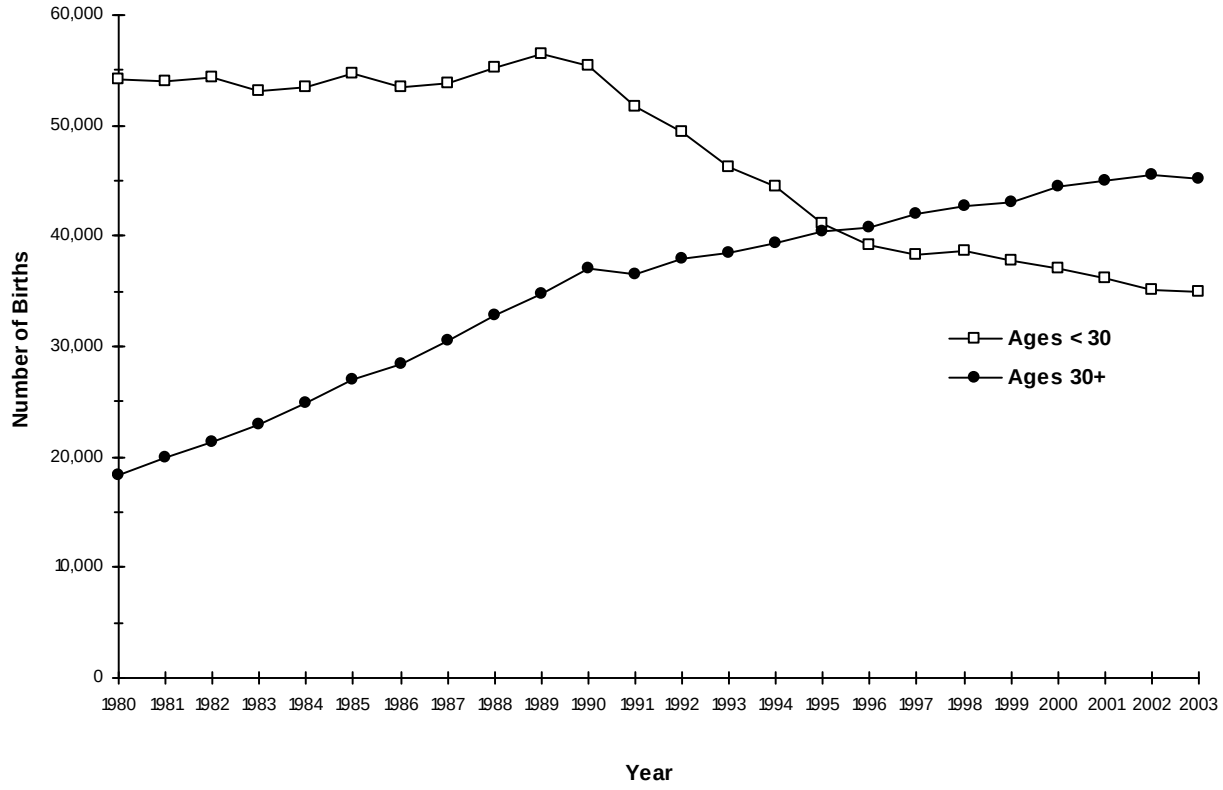
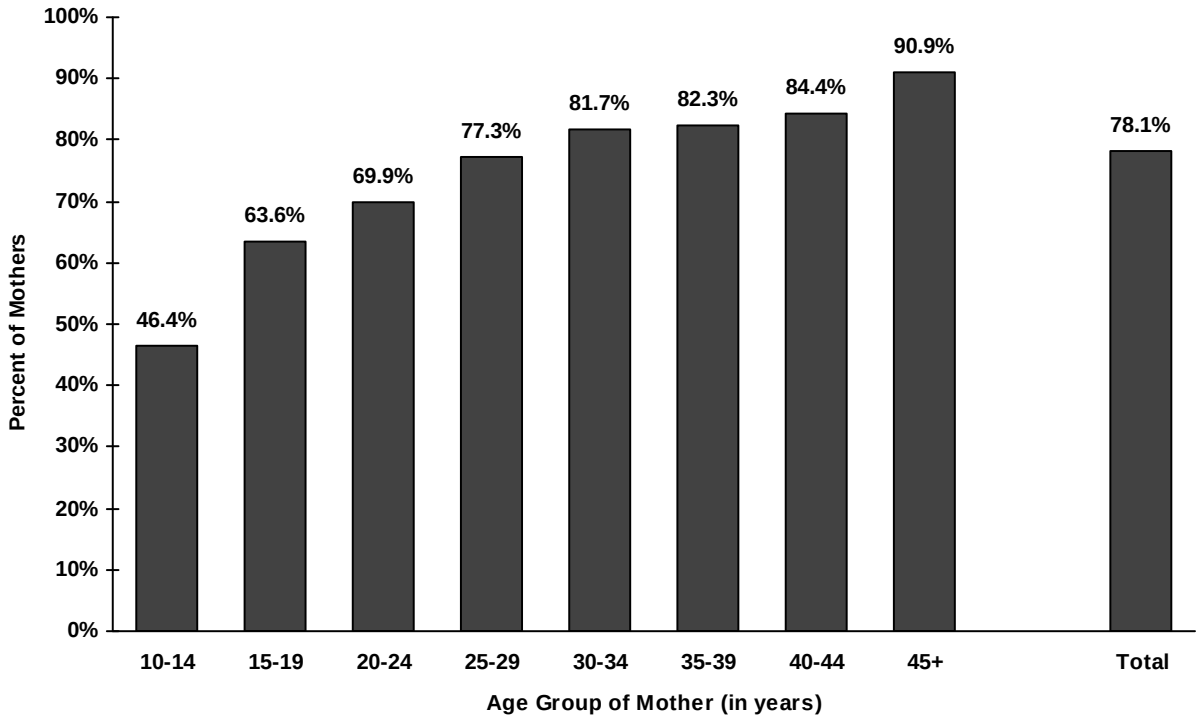


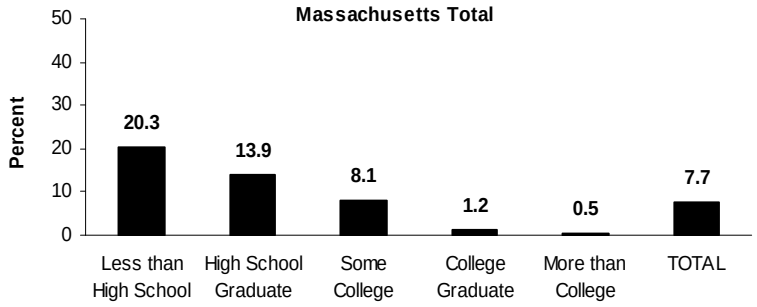
Figure 2. Percent of Mothers Breastfeeding or Intending to Breastfeed[1] by Age Group, Massachusetts [2]: 2003

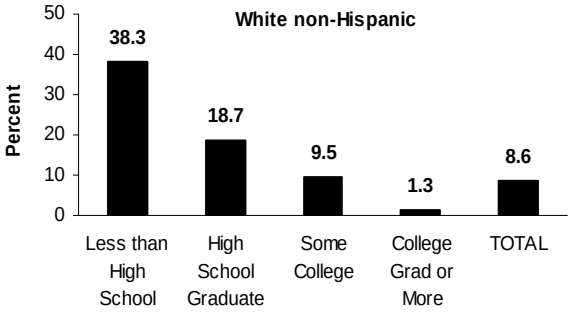


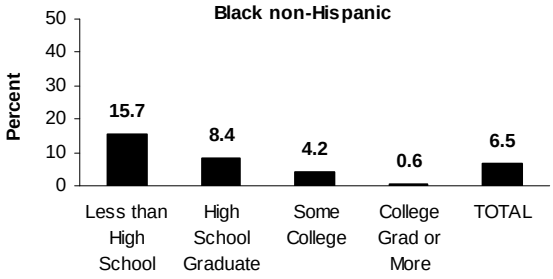
NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

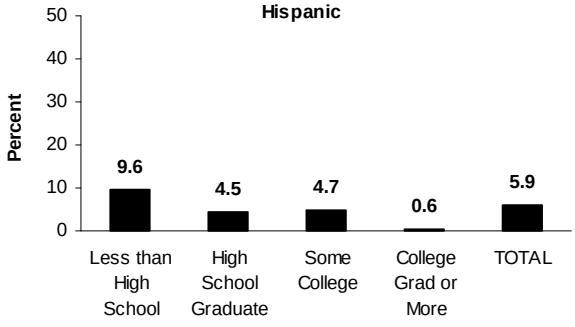
1. Information about breastfeeding is reported by the mother at the time the birth.
2. For race-specific breastfeeding rates see Table 2A.

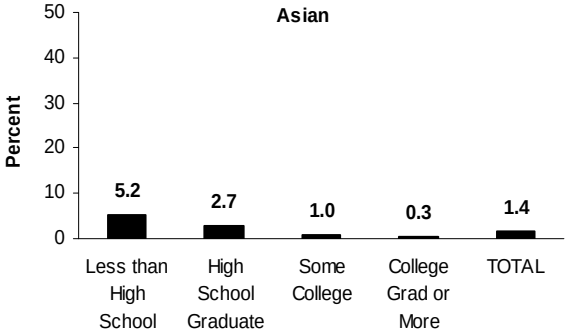
Figure 3. Percent of Mothers who Smoked During Pregnancy[1], by Mother's Race/Hispanic Ethnicity and Educational Attainment, Massachusetts: 2003







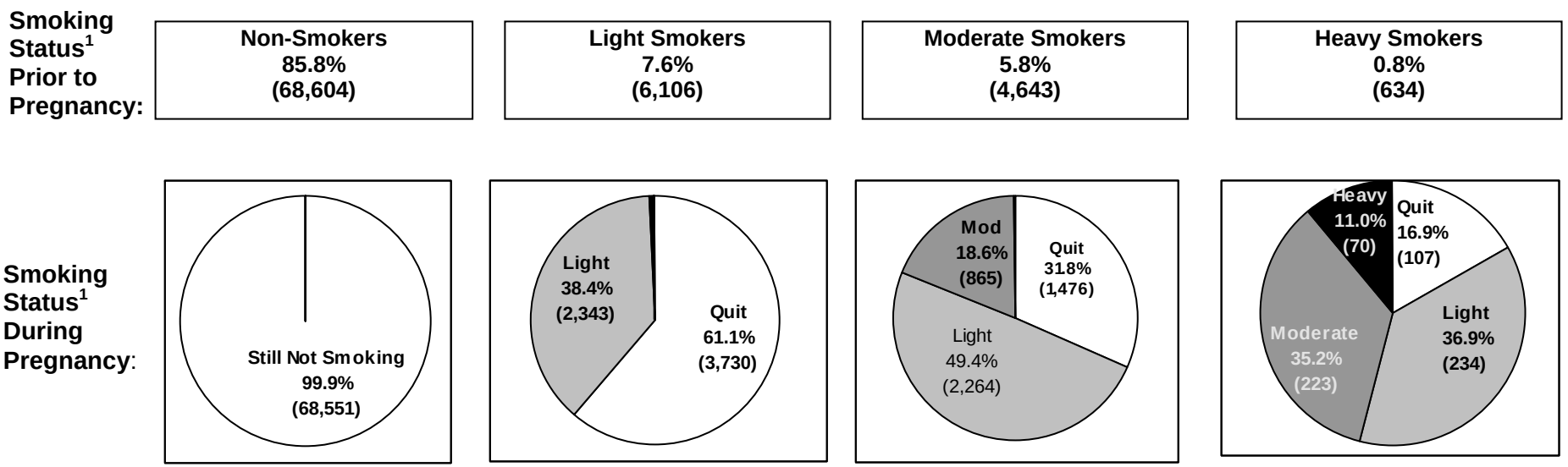




NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Based on information provided on parent worksheet. Due to self-reported nature, data on smoking prevalence should be interpreted cautiously. Mothers with more than one delivery are counted for each birth. 2. Caution should be used with Asian data because of small numbers.

Figure 4. Distribution of Smoking Status[1] during Pregnancy by Smoking Status Prior to Pregnancy, Massachusetts: 2003



99.9% of Non-Smokers continued not smoking (0.1% started smoking)

61.1 % of Light Smokers quit smoking (0.6% increased)

81.2% of Moderate Smokers decreased the number of cigarettes smoked daily or quit (0.5% increased)

89.0% of Heavy Smokers decreased the number of cigarettes smoked daily or quit

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Light Smokers=1-10 cigarettes daily; Moderate Smokers=11-20 cigarettes daily; Heavy Smokers=21 cigarettes or more daily.

Table 5. Parity[1] by Age of Mother, Massachusetts: 2003

Age of Mother (years)		Total Births	1st	2nd	3rd	4th	5th+
STATE TOTAL	n[2]	80,167	35,286	27,800	11,448	3,619	1,806
	%[3]	100.0	44.1	34.8	14.3	4.5	2.3
10-14	n	56	56	0	0	0	0
	%	100.0	100.0	0.0	0.0	0.0	0.0
15-19	n	4,639	3,950	603	68	5	0
	%	100.0	85.4	13.0	1.5	0.1	0.0
20-24	n	11,894	6,662	3,741	1,143	250	61
	%	100.0	56.2	31.6	9.6	2.1	0.5
25-29	n	18,436	9,045	5,911	2,379	713	343
	%	100.0	49.2	32.1	12.9	3.9	1.9
30-34	n	26,829	10,390	10,564	3,979	1,258	570
	%	100.0	38.8	39.5	14.9	4.7	2.1
35-39	n	14,889	4,216	5,787	3,214	1,067	571
	%	100.0	28.4	39.0	21.6	7.2	3.8
40-44	n	3,260	911	1,142	637	316	244
	%	100.0	28.0	35.1	19.6	9.7	7.5
45+	n	159	53	51	28	10	17
	%	100.0	33.3	32.1	17.6	6.3	10.7

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. The number of live births including this birth. 2. State totals include births of unknown parity and unknown mother's age. 3. Percents may not sum to 100.0 due to rounding.

Table 6. Trends in Number and Percent Distribution of Births[1] by Plurality and Age, Massachusetts: 1990-2003

Age Group	Year	Singletons		Multiples[2]						Total births	
				Twins		Triplets or more		Total Multiples			
		n	%	n	%	n	%	n	%	n	%
All Ages											
	1990	90,049	97.4	2,312	2.5	99	0.1	2,411	2.6	92,460	100.0
	1991	85,802	97.3	2,285	2.6	89	0.1	2,374	2.7	88,176	100.0
	1992	84,722	97.2	2,347	2.7	133	0.2	2,480	2.8	87,202	100.0
	1993	82,055	97.0	2,367	2.8	205	0.2	2,572	3.0	84,627	100.0
	1994	81,187	96.9	2,357	2.8	214	0.3	2,571	3.1	83,758	100.0
	1995	78,935	96.8	2,429	3.0	198	0.2	2,627	3.2	81,562	100.0
	1996	77,355	96.5	2,621	3.3	194	0.2	2,815	3.5	80,164	100.0
	1997	77,203	96.1	2,856	3.6	262	0.3	3,118	3.9	80,321	100.0
	1998	78,004	95.8	3,114	3.8	288	0.4	3,402	4.2	81,406	100.0
	1999	77,473	95.8	3,147	3.9	246	0.3	3,393	4.2	80,866	100.0
	2000	78,075	95.7	3,263	4.0	244	0.3	3,507	4.3	81,582	100.0
	2001	77,409	95.6	3,371	4.2	234	0.3	3,605	4.4	81,014	100.0
	2002	76,673	95.1	3,708	4.6	243	0.3	3,951	4.9	80,624	100.0
	2003	76,367	95.3	3,551	4.4	249	0.3	3,800	4.7	80,167	100.0
Ages <35											
	1990	79,081	97.5	1,946	2.4	70	0.1	2,016	2.5	81,097	100.0
	1991	74,810	97.5	1,863	2.4	76	0.1	1,939	2.5	76,749	100.0
	1992	73,043	97.3	1,914	2.6	103	0.1	2,017	2.7	75,060	100.0
	1993	70,042	97.2	1,849	2.6	158	0.2	2,007	2.8	72,049	100.0
	1994	68,644	97.2	1,844	2.6	164	0.2	2,008	2.8	70,652	100.0
	1995	65,669	97.2	1,787	2.6	141	0.2	1,928	2.9	67,597	100.0
	1996	63,560	96.9	1,935	2.9	126	0.2	2,061	3.1	65,621	100.0
	1997	62,598	96.7	1,949	3.0	170	0.3	2,119	3.3	64,717	100.0
	1998	62,719	96.4	2,193	3.4	170	0.3	2,363	3.6	65,082	100.0
	1999	61,816	96.4	2,147	3.3	150	0.2	2,297	3.6	64,113	100.0
	2000	61,659	96.4	2,205	3.4	130	0.2	2,335	3.6	63,994	100.0
	2001	60,704	96.3	2,211	3.5	134	0.2	2,345	3.7	63,049	100.0
	2002	59,736	96.0	2,379	3.8	127	0.2	2,506	4.0	62,242	100.0
	2003	59,347	95.9	2,389	3.9	118	0.2	2,507	4.1	61,854	100.0
Ages 35+											
	1990	10,968	96.5	366	3.2	29	0.3	395	3.5	11,363	100.0
	1991	10,987	96.2	422	3.7	13	0.1	435	3.8	11,422	100.0
	1992	11,675	96.2	433	3.6	30	0.3	463	3.8	12,138	100.0
	1993	12,007	95.5	518	4.1	47	0.4	565	4.5	12,572	100.0
	1994	12,543	95.7	513	3.9	50	0.4	563	4.3	13,106	100.0
	1995	13,264	95.0	642	4.6	57	0.4	699	5.0	13,963	100.0
	1996	13,793	94.8	686	4.7	68	0.5	754	5.2	14,547	100.0
	1997	14,602	93.6	907	5.8	92	0.6	999	6.4	15,601	100.0
	1998	15,282	93.6	921	5.6	118	0.7	1,039	6.4	16,321	100.0
	1999	15,657	93.5	1,000	6.0	96	0.6	1,096	6.5	16,753	100.0
	2000	16,412	93.3	1,058	6.0	114	0.6	1,172	6.7	17,584	100.0
	2001	16,703	93.0	1,160	6.5	100	0.6	1,260	7.0	17,963	100.0
	2002	16,936	92.1	1,329	7.2	116	0.6	1,445	7.9	18,381	100.0
	2003	17,015	92.9	1,162	6.3	131	0.7	1,293	7.1	18,308	100.0

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Differences in the number of births from previous publications are the result of updating of files. 2. Numbers of multiples (n) represent individual infants rather than sets of infants.

Table 7. Selected Birth Characteristics by Maternal Education, Massachusetts: 2003

	Less than High School		High School Graduate		Some College		College Graduate		More than College	
	n	%[1]	n	%[1]	n	%[1]	n	%[1]	n	%[1]
State Total	**7,915**	**9.9**	**19,762**	**24.7**	**17,944**	**22.4**	**21,484**	**26.9**	**12,882**	**16.1**
Race										
White non-Hispanic	2,856	5.0	12,434	21.6	13,189	22.9	18,258	31.7	10,818	18.8
Black non-Hispanic	753	12.8	2,113	35.8	1,937	32.8	800	13.6	294	5.0
Hispanic	3,353	34.4	3,642	37.3	1,762	18.1	690	7.1	313	3.2
Asian	667	12.8	1,019	19.5	721	13.8	1,539	29.5	1,276	24.4
Age										
20-29	3,723	12.3	10,660	35.2	8,230	27.2	5,546	18.3	2,117	7.0
30-39	1,478	3.6	6,752	16.2	8,730	21.0	14,751	35.4	9,903	23.8
40+	138	4.1	551	16.2	693	20.3	1,165	34.2	860	25.2
Non-U.S.-born[2]	3,130	39.6	5,850	29.6	3,664	20.4	3,929	18.3	2,752	21.4
Unmarried	5,762	72.8	9,458	47.9	5,144	28.7	1,414	6.6	433	3.4
Publicly-financed prenatal care	6,230	80.0	10,093	52.1	4,756	26.9	1,286	6.1	291	2.3
Very low birthweight[3]	124	1.6	313	1.6	251	1.4	285	1.3	131	1.0
Low birthweight[4]	736	9.3	1,645	8.3	1,330	7.4	1,517	7.1	868	6.7
Adequate prenatal care[5]	5,517	70.7	15,824	80.9	15,155	85.1	18,990	88.8	11,591	90.4
Cesarean section delivery	1,761	22.4	5,541	28.2	5,554	31.1	6,574	30.7	3,922	30.5
Breastfeeding[6]	4,900	62.5	13,248	68.1	13,312	75.3	18,341	87.3	11,518	92.0
Multiple births	164	2.1	712	3.6	864	4.8	1,286	6.0	770	6.0
Smoking during pregnancy	1,609	20.3	2,746	13.9	1,451	8.1	254	1.2	58	0.5

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

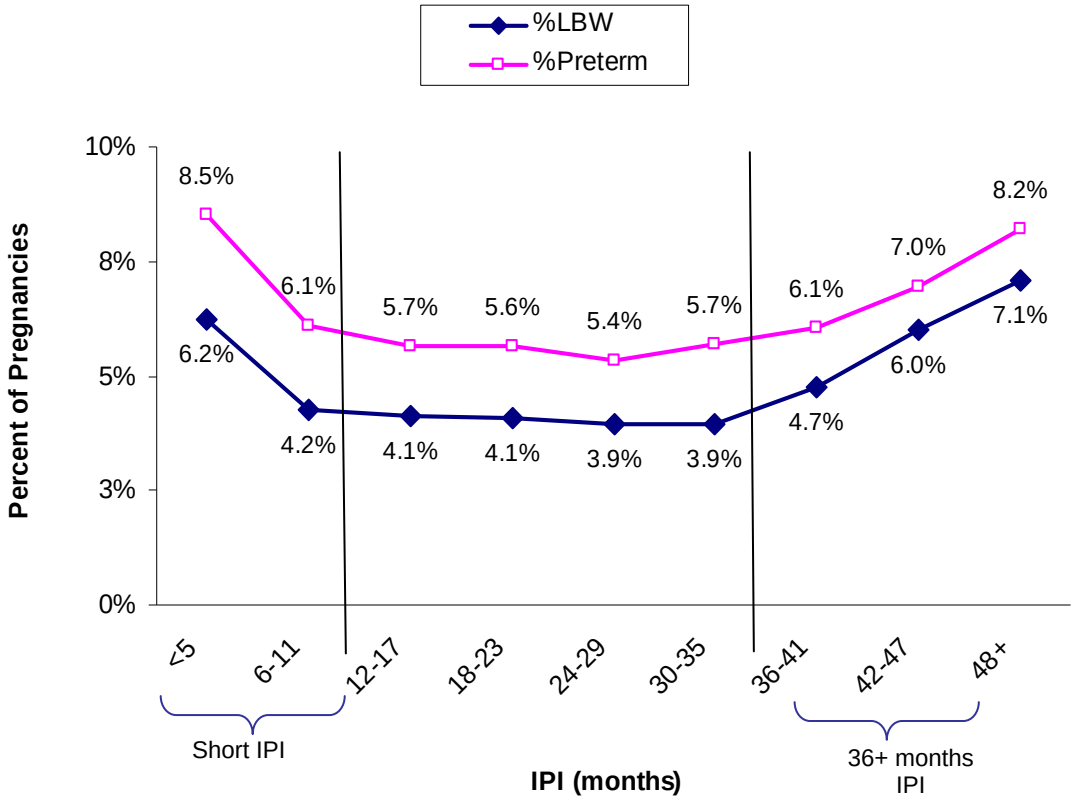
1. For state total, race and age categories, percentages are based on row totals. For all other categories, percentages are based on state column totals. 2. Includes women born outside of the 50 U.S. States, Washington D.C., and Puerto Rico/U.S. territories (the U.S. Virgin Islands, and Guam). 3. Very low birthweight: less than 1,500 grams or 3.3 pounds. 4. Low birthweight: less than 2,500 grams or 5.5 pounds. 5. Beginning with the 2001 publication, the Adequacy of Prenatal Care Utilization Index has replaced the Kessner Index as the measure of adequate prenatal care. 6. Mother was breastfeeding or was intending to breastfeed at the time the birth certificate was completed.

Table 8A. Interpregnancy Intervals[1] (IPI) and Birth Outcomes. Pregnancies to Multiparous[2] Mothers, Massachusetts: 2003

	IPI (months)	Pregnancies	Birth Weight (BW)				Gestational Age (GA)			
			Low Birthweight (<2,500 g)		Very Low Birthweight (<1,500 g)		Preterm[3] (<37 wk)		Very Early[4] (<28 wk)	
			n	% LBW[5]	n	% VLBW	n	% Preterm	n	% VEGA
	State Total	42,329	2,162	**5.1**	357	**0.8**	2,773	**6.6**	166	**0.4**
	<5	1,879	117	**6.2**	27	**1.4**	159	**8.5**	14	**0.7**
	6-11	4,836	205	**4.2**	34	**0.7**	295	**6.1**	19	**0.4**
	12-17	6,101	251	**4.1**	36	**0.6**	344	**5.7**	21	**0.3**
	18-23	5,492	225	**4.1**	28	**0.5**	309	**5.6**	12	**0.2**
	24-29	4,519	178	**3.9**	24	**0.5**	241	**5.4**	10	**0.2**
	30-35	3,396	134	**3.9**	17	**0.5**	192	**5.7**	10	**0.3**
	36-41	2,705	128	**4.7**	20	**0.7**	163	**6.1**	8	**0.3**
	42-47	2,119	127	**6.0**	18	**0.8**	147	**7.0**	5	**0.2**
	48+	11,282	797	**7.1**	153	**1.4**	923	**8.2**	67	**0.6**
Short	**< 12**	6,715	322	**4.8**	61	**0.9**	454	**6.8**	33	**0.5**
	12-35	19,508	788	**4.0**	105	**0.5**	1,086	**5.6**	53	**0.3**
	36+	16,106	1,052	**6.5**	191	**1.2**	1,233	**7.7**	80	**0.5**

1. Interpregnancy Interval (IPI) is calculated in months between the date of last menstrual period of the current pregnancy and the date of previous live birth, among pregnancies to multiparous mothers (parity >1). 2. Multiparous is defined a shaving given birth 2 or more times. 3. Also known as premature delivery. 4. Very early gestational age (VEGA) refers to birth delivery before 28 weeks of gestation age and is also known as **extremely preterm** delivery. 5. These are the row percentages, that is, the relevant column N/the row totals.

Figure 5A. Interpregnancy Interval (IPI)[1] vs. LBW[2] and Preterm[3] Pregnancies to Multiparous Mothers[4], Massachusetts: 2003



NOTE: Percentages are calculated based on pregnancies to mothers who gave birth to their 2nd or later child in 2003 and with known values for the characteristic(s) of interest, unless otherwise stated.

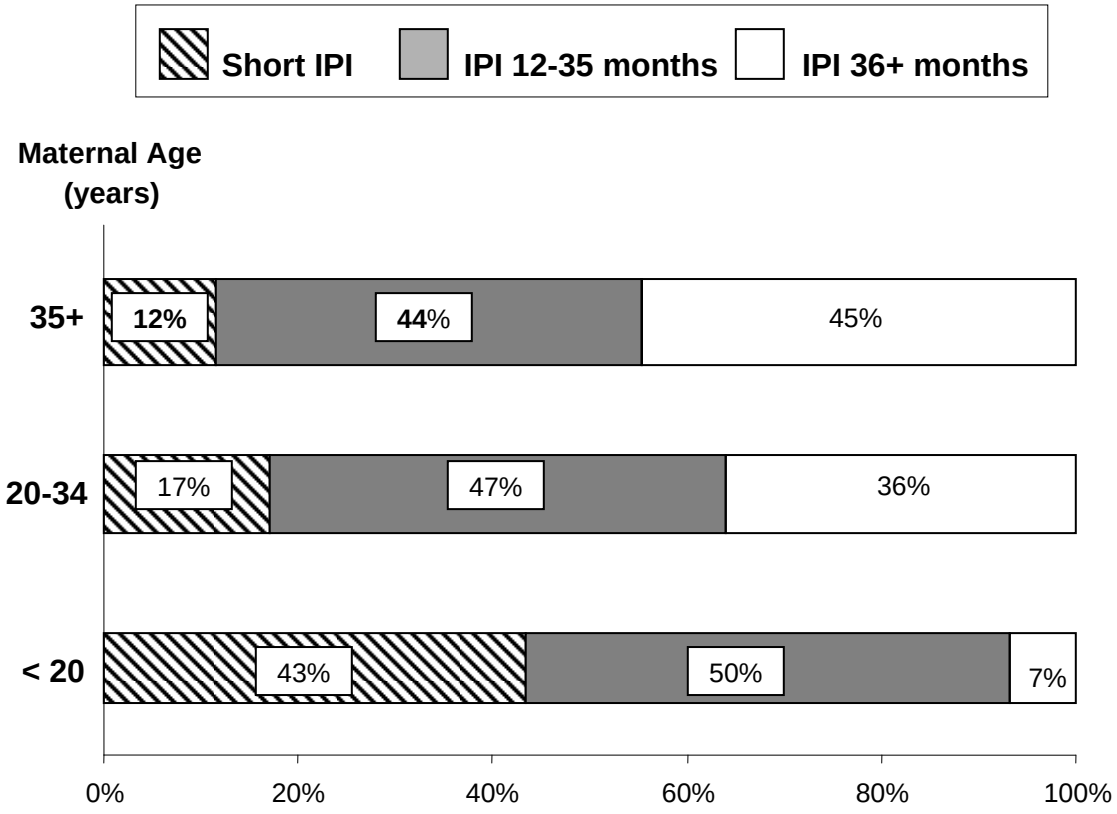
1. See Table 8A.
2. Low birthweight: less than 2,500 grams or 5.5 pounds.
3. Preterm delivery is defined as gestational age less than 37 weeks. It is also known as premature delivery.
4. Multiparous is defined a shaving given birth 2 or more times.

Table 8B. Interpregnancy Interval[1] (IPI) by Maternal Characteristics Pregnancies to Multiparous Mothers[2], Massachusetts: 2003

	Total Pregnancies Parity >1	IPI					
		Short (< 12 months)		(12-35 months)		(36+ months)	
		N	%	N	%	N	%
State Total[3]	**42,329**	**6,715**	**15.9%**	**19,508**	**46.1%**	**16,106**	**38.0%**
Age							
< 20	632	274	43.4%	315	49.8%	43	6.8%
20-34	29,401	5,017	17.1%	13,810	47.0%	10,574	36.0%
35+	12,296	1,424	11.6%	5,383	43.8%	5,489	44.6%
Race Ethnicity							
White non-Hispanic	30,220	4,988	16.5%	15,137	50.1%	10,095	33.4%
Black non-Hispanic	3,318	449	13.5%	1,098	33.1%	1,771	53.4%
Hispanic	5,564	827	14.9%	1,969	35.4%	2,768	49.7%
Asian non-Hispanic	2,430	341	14.0%	1,017	41.9%	1,072	44.1%
Education							
High school or less	15,071	2,314	15.4%	5,529	36.7%	7,228	48.0%
College or some college	20,996	3,351	16.0%	10,201	48.6%	7,444	35.5%
More than college	6,206	1,044	16.8%	3,751	60.4%	1,411	22.7%
Delivery Payment Source							
Public	12,464	1,994	16.0%	4,484	36.0%	5,986	48.0%
Private	28,750	4,529	15.8%	14,493	50.4%	9,728	33.8%
EOHHS Region of Residency							
Western	5,131	853	16.6%	2,209	43.1%	2,069	40.3%
Central	5,843	873	14.9%	2,702	46.2%	2,268	38.8%
Northeast	8,944	1,426	15.9%	4,114	46.0%	3,404	38.1%
Metrowest	9,327	1,553	16.7%	4,917	52.7%	2,857	30.6%
Southeast	8,226	1,268	15.4%	3,736	45.4%	3,222	39.2%
Boston	4,858	742	15.3%	1,830	37.7%	2,286	47.1%
Town of Residency[4]		**10 Largest by %**		**10 Largest by %**		**10 Largest by %**	
		Billerica	(20.7%)	Needham	(68.8%)	Chelsea	(60.3%)
		Weymouth	(20.5%)	Wellesley	(61.1%)	Revere	(51.6%)
		Holyoke	(20.5%)	Arlington	(57.7%)	Lynn	(49.8%)
		Quincy	(19.8%)	Natick	(57.5%)	Fall River	(49.7%)
		Natick	(19.4%)	Chelmsford	(57.4%)	Everett	(49.6%)
		Westfield	(19.3%)	Franklin	(56.6%)	Malden	(49.6%)
		Dracut	(18.9%)	Brookline	(56.2%)	Lawrence	(48.8%)
		Springfield	(18.6%)	Braintree	(54.9%)	Brockton	(48.8%)
		Lowell	(18.6%)	Mansfield	(52.8%)	New Bedford	(48.0%)
		Methuen	(18.4%)	Shrewsbury	(52.2%)	Randolph	(47.2%)

1. See Table 8A. 2. Multiparous is defined as having given birth 2 or more times. 3. State total includes pregnancies with known IPI. 4. Among towns with at least 200 mothers giving birth to their 2nd or later child.

Figure 5B. Interpregnancy Interval (IPI)[1] Distribution by Maternal Age
Pregnancies to Multiparous[2] Mothers, Massachusetts: 2003



NOTE: Short IPI refers to interpregnancy intervals less than 12 months.

1. See Table 8A.
2. Multiparous is defined as having given birth 2 or more times.

Table 9. Comparison of Massachusetts Perinatal Health Indicators with Healthy People 2010 Objectives[1]

Healthy People 2010 Objectives (Focus Area 16: Maternal, Infant and Child Health[2])	HP2010 Target	Massachusetts 2000	2001	2002	2003	Has Massachusetts achieved HP2010 target? ✓ = YES ○ = NO, but within 25% of target ● = NO, > 25% from target
Fetal, Infant, and Maternal Deaths						
16-1a. Fetal Mortality Rate[3]	4.1	5.3	4.7	4.6	5.7	●
16-1b. Perinatal Mortality Rate[4]	4.5	5.4	5.6	4.7	5.8	●
16-1c. Infant Mortality Rate[5]	4.5	4.6	5.0	4.9	4.8	○
16-1d. Neonatal Mortality Rate[6]	2.9	3.5	3.8	3.7	3.6	○
16-1e. Postneonatal Mortality Rate[7]	1.2	1.1	1.2	1.2	1.2	✓
16-4. Maternal Mortality Ratio[8]	3.3	1.2	4.9	2.4	4.9	●
Risk Factors						
16-10a. Low Birthweight[9] (%)	5.0	7.1	7.2	7.5	7.6	●
16-10b. Very Low Birthweight[10] (%)	0.9	1.4	1.4	1.4	1.4	●
16-11a. Preterm[11] (%)	7.6	8.3	8.0	8.5	8.7	○
Prenatal Care						
16-6a. Care beginning in first trimester (%)	90	83.8	84.3	84.2	83.9	○
16-6b. Early and adequate care[12] (%)	90	83.3	85.2	85.0	84.5	○
Obstetrical Care						
16-8. Very Low Birthweight[10] Infants born at Level III Hospitals[13] (%)	90	83.4	79.1	81.2	79.1	○
16-9a. Cesarean Sections: Low-Risk[14] Women Giving Birth for the First Time (%)	15	20.5	22.0	24.0	25.0	●
16-9b. Cesarean Sections: Low-Risk[14] Women with Prior Cesarean Section (%)	63	72.7	79.2	84.2	86.7	●
Breastfeeding						
16-19a. Breastfeeding[15] (%)	75	73.8	75.3	76.1	78.1	✓
Prenatal Substance Exposure						
16-17c. Abstinence from Smoking (%)	99	90.3	90.9	92.1	92.3	○

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. National health promotion and disease prevention agenda established by the U.S. Dept. of Health and Human Services. 2. Goal: to improve the health and well-being of women, infants, children, and families. 3. Number of fetal deaths per 1,000 fetal deaths plus live births. 4. Number of fetal and infant deaths in perinatal period (from 28 weeks gestation (inclusive) to 6 days (inclusive) after birth per 1,000 fetal deaths plus live births. 5. Number of infant deaths (under one year of age) per 1,000 live births. 6. Number of deaths to infants less than 28 days of age per 1,000 live births. 7. Number of deaths to infants 28-364 days of age per 1,000 live births. 8. See Definition of Rates section in Appendix. 9. Less than 2,500 grams, or 5.5 pounds. 10. Less than 1,500 grams, or 3.3 pounds. 11. Born before completion of 37th week of gestation. 12. Based on Adequacy of Prenatal Care Utilization Index (see glossary). 13. Facilities for high-risk deliveries and neonates that can provide care to very small infants, including mechanical ventilation and neonatal surgery and special care for transferred patients and for which a full-time neonatologist serves as the director. 14. "Low-risk"= full term birth, singleton, vertex presentation. 15. HP2010 specifies objective as mother breastfeeding in "early postpartum period." Massachusetts data is based on mother's self-report of current breastfeeding or intention to breastfeed.

CHAPTER 2

TEEN BIRTH CHARACTERISTICS

Birth Numbers and Rates

In 2003, the number of births to Massachusetts women ages 15-19 (4,639) was almost the same as the number for this age group in 2002 (4,642) (Table 1). The number of resident live teen births in Massachusetts has decreased by 29% since 1992 (6,555 births). In 2003, about one-third of the teen births were to women ages 15-17 (1,473 births), and two-thirds were to women ages 18-19 (3,166) (Table 10).

The annual number of births to young teens (ages 12-14) continued to decline in 2003, from a peak of 155 in 1994 to the current low of 56. This represents a 23% decline in births in this age group from 2002 (Table 4).

The Massachusetts teen birth rate decreased by 36% from 35.4 births per 1,000 women ages 15-19 in 1990 to 22.6 in 2002, and remained the same in 2003 (Table 1). The Massachusetts teen birth rate in 2003 was 46% below the preliminary U.S. teen birth rate of 41.7 births per 1,000 women ages 15-19 (National Vital Statistics Reports, Vol. 53, No. 9, November 23, 2004, p. 3) (Figure 7).

Overall, teen mothers were more likely than adult women to have specific characteristics that may be associated with adverse birth outcomes. Teen mothers were less likely to breastfeed, less likely to be married, less likely to receive adequate prenatal care, and more likely to smoke during pregnancy than adult women. Teen mothers also had more adverse birth outcomes (i.e. higher rates of low birthweight and preterm infants) than adult women, reflecting an increased risk associated with adolescent maternity.

Although Massachusetts continues to have a low teen birth rate relative to most other states and the nation as a whole, some Massachusetts communities have teen birth rates that are much higher than the state rate (Table 3A). There are disparities in LBW and adequacy of prenatal care among the race/Hispanic ethnicity groups in Massachusetts as well.

Distribution of Births by Race and Hispanic Ethnicity and Mother's Birthplace

In 2003, 55.4% of births to young teens (ages 12-14) were to Hispanic mothers (31 births); 21.4% were to white non-Hispanic mothers (12 births); and 19.6% were to black non-Hispanic mothers (11 births).

In 2003, 47.7% of births to Massachusetts residents ages 15-19 were to white non-Hispanic mothers; 33.5% were to Hispanic mothers; 11.8% were to black non-Hispanic mothers; 3.9% were to Asian mothers; and 3.2% were to mothers of other races (Table 10).

In 2003, birth rates among resident teen women were in the same relative order by race and Hispanic ethnicity as they were in 1993 (Hispanic and black non-Hispanic women had the highest teen birth rates, while Asian and white non-Hispanic women had the lowest), and they have decreased for all groups compared with 1993 rates. However, black non-Hispanics have had the greatest decrease, 55% from 1993 (88.7) to 2003 (40.3); the Hispanic teen birth rate has decreased by 40% (from 130.0 to 78.3); and the Asian teen birth rate has decreased by 38% (from 26.5 to 16.5). The white non-Hispanic teen birth rate declined the least at 36% (from 21.5 to 13.7) (Figure 8).

In 2003, there were slight increases in teen birth rates for some groups compared with the previous year. In 2003, teen birth rates for white non-Hispanics increased by 2% from 2002 (13.7 vs. 13.4). The Hispanic teen birth rate increased 3% over its 2002 rate (78.3 vs. 76.4). The black teen birth rate declined from 45.9 to 40.3 (12%) and the Asian teen birth rate decreased from 18.6 to 16.5 (11.3%).

Seventy-six percent of teen births were to mothers who were born in the 50 U.S. states or the District of Columbia. Eight percent of teen births were to mothers born in Puerto Rico or other U.S. Territories, and the percentage of births to non-U.S.-born teen mothers was 15% (Table 10).

Low Birthweight

In 2003, 9.3% of the infants born to women under age 20 were low birthweight (less than 2,500 grams or 5.5 pounds) as compared with 7.5% of infants born to Massachusetts women ages 20 and older (Figure 6).

The percentage of low birthweight infants was 39% greater for teen mothers ages 15-17 (11.1%) than for teens ages 18-19 (8.0%) (Table 10).

Preterm

In 2002, 9.1% of infants born to women under age 20 were preterm (born before the mother had completed the 37th week of pregnancy) as compared with 8.7% of infants born to Massachusetts women ages 20 and older (Figure 6).

The percentage of preterm infants was 11% greater for teen mothers ages 15-17 (8.8%) than for teens ages 18-19 (7.9%) (Table 10).

Prenatal Care

In 2003, of the births to women under age 20, 72.0% of the mothers received adequate prenatal care, compared with 85.3% of births to women ages 20 and over, which is 18% greater (Figure 6). (Adequacy of prenatal care is a measure of the timing and number of prenatal care visits.)

The percentage of women ages 15-17 that received inadequate prenatal care (21.1%) was 23% greater for women ages 18-19 (17.1%) (Table 10). Seventy-five percent of women less than 20 years of age had their prenatal care funded by public sources, compared with 26% of women ages 20 and over (Figure 6).

Teen Birth Characteristics in the 30 Largest Massachusetts Cities and Towns

In 2003, among live births to women ages 15-19 who were residents of the 30 largest cities and towns in the Commonwealth:

- Teen birth rates (number of births per 1,000 females 15-19) were highest in Lawrence (82.9), Springfield (79.3), New Bedford (56.7), Fall River (55.9), and Pittsfield (52.9). These rates range from over two times to almost four times the statewide teen birth rate of 22.6. In 2003, all but New Bedford experienced increases in teen birth rates from the previous year.

- In 2003, teen birth rates were lowest in Arlington (9.1), Medford (8.6), and Cambridge (7.2). Newton and Brookline had less than 5 teen births each (Table 11).

- Among births to teen mothers, eleven communities (Peabody, Arlington, Weymouth, Barnstable, Lowell, Malden, Framingham, Haverhill, Lawrence, New Bedford, and, Worcester) recorded low birthweight percentages that were at least 25% higher than the statewide average of 9.3% for teen mothers (Table 11).

- Over 85% of mothers ages 15-19 living in Somerville and Springfield had their prenatal care paid for by a public source. Only 45% of mothers ages 15-19 living in Methuen had their prenatal care paid for by a public source (Table 11).

- Over 80% of mothers ages 15-19 living in Cambridge, Haverhill, Framingham, Lawrence, Quincy, and Chicopee received adequate prenatal care. In contrast, fewer than 55% of teen mothers living in Peabody, Pittsfield, and Lowell received adequate prenatal care (Table 11).

Communities with Highest Teen Births

Among the communities with the greatest number of teen births, teen birth rates were highest in Holyoke (91.9), Lawrence (82.9), Springfield (79.3), Southbridge (66.5), and Chelsea (61.7). These communities had rates of almost three to greater than 4 times the statewide rate of 22.6 teen births per 1,000 females 15-19 (Table 12).

Tobacco Use

In 2003, 16.8% of teen births were to mothers who reported smoking cigarettes during their pregnancies (Table 10). In comparison, only 7.1% of mothers ages 20 and over reported smoking during pregnancy (Figure 6).

For teen mothers ages 18-19, 18.2% smoked cigarettes during their pregnancies compared with 13.7% of mothers ages 15-17 (Table 10).

Parity

In 2003, 85.4% of all live births to teen mothers were the mother's first live-born infant. The percentage of births that were the teen mother's second live-born infant was 13.0%, and only 1.6% were the mother's third or greater live-born infants (Table 10).

As expected, mothers ages 18-19 had the greatest percentage of previous live births; almost three times higher (18.0% v. 7.3%) than teens ages 15-17 (Table 10).

Plurality

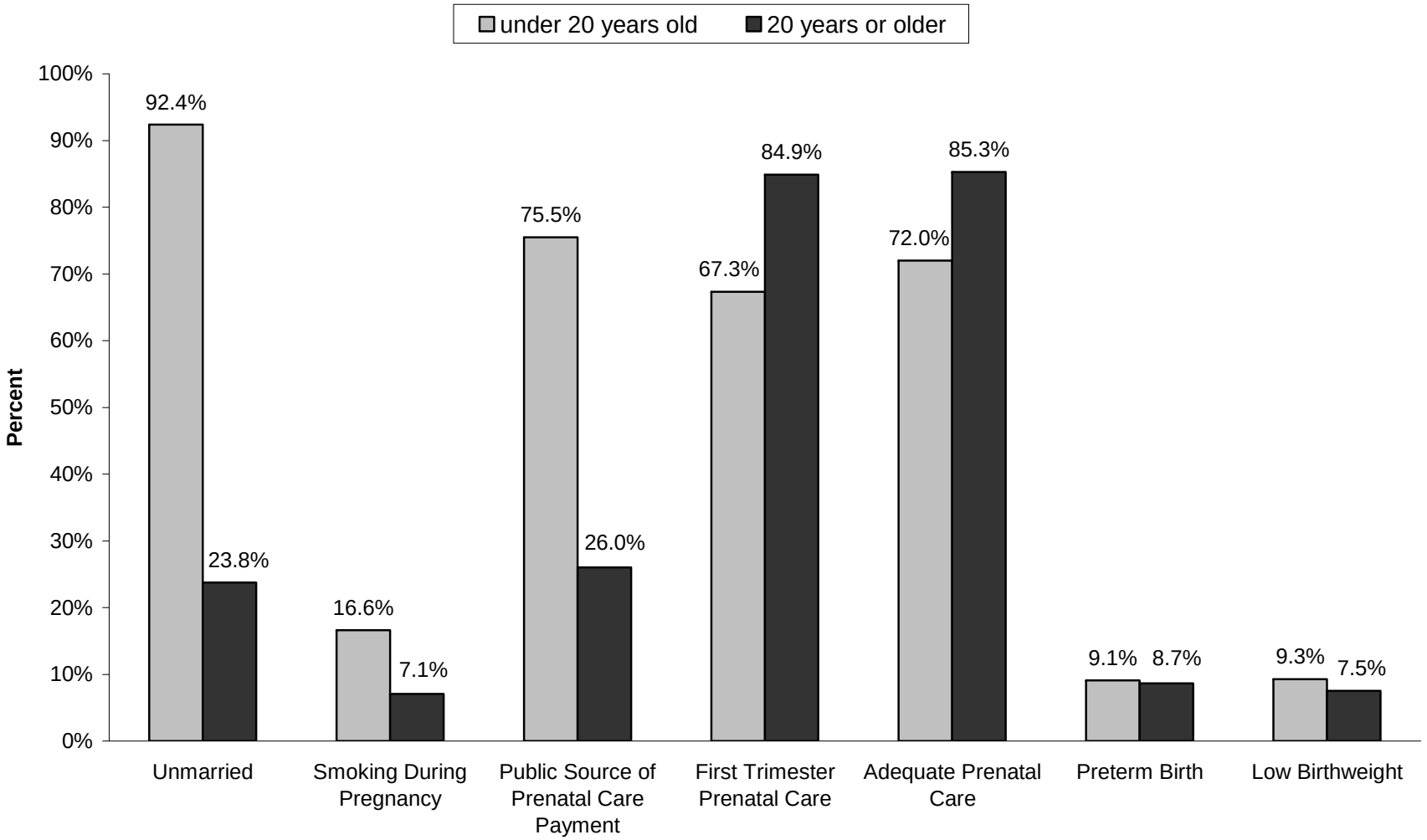
Plurality represents the number of births to a woman in one delivery. In 2003, 98.6% of all births to mothers ages 15-19 were singletons, and 1.4% were twins or higher order multiple births (Table 10).

Table 10. Summary of Selected Teen Birth Characteristics, Massachusetts: 2003

	Age 15-17		Age 18-19		Combined Ages 15-19	
	N	%[1]	N	%[1]	N	%[1]
State total	1,473	31.8%	3,166	68.2%	4,639	100.0%
Maternal Demographics						
Race/Hispanic Ethnicity	N	%[2]	N	%[2]	N	%[2]
White non-Hispanic	581	39.5%	1,630	51.5%	2,211	47.7%
Black non-Hispanic	190	12.9%	356	11.3%	546	11.8%
Asian	67	4.6%	113	3.6%	180	3.9%
Hispanic	588	40.0%	962	30.4%	1,550	33.5%
Other	45	3.1%	101	3.2%	146	3.2%
Birthplace						
U.S. States / D.C.	1,130	76.8%	2,402	75.9%	3,532	76.2%
Puerto Rico / US Terr.	149	10.1%	239	7.6%	388	8.4%
Non-U.S.-born	192	13.1%	523	16.5%	715	15.4%
Prenatal care funding						
Public	1,049	72.8%	2,374	76.4%	3,423	75.3%
Private, other	392	27.2%	732	23.6%	1,124	24.7%
Pregnancy-Related Factors						
Adequacy of Prenatal Care[3]						
Adequate Total[4]	1,001	68.9%	2,306	73.8%	3,307	72.2%
Adequate Intensive	481	33.1%	1,076	34.4%	1,557	34.0%
Adequate Basic	520	35.8%	1,230	39.3%	1,750	38.2%
Intermediate	144	9.9%	285	9.1%	429	9.4%
Inadequate/None	307	21.1%	535	17.1%	842	18.4%
Unknown	21	1.4%	40	1.3%	61	1.3%
Parity[6]						
1	1,360	92.7%	2,590	82.0%	3,950	85.4%
2	104	7.1%	499	15.8%	603	13.0%
3+	3	--[5]	70	2.2%	73	1.6%
Smoking during Pregnancy						
Yes	202	13.7%	576	18.2%	778	16.8%
No	1,268	86.3%	2,585	81.8%	3,853	83.2%
Birth Outcomes						
Birthweight						
< 500 g	6	0.4%	7	0.2%	13	0.3%
500-1,499 g	26	1.8%	46	1.5%	72	1.6%
1,500-2,499 g	130	8.9%	213	6.7%	343	7.4%
LBW (<2,499 g)	162	11.1%	266	8.0%	428	9.3%
2,500-3,999 g	1,245	84.9%	2,715	85.9%	3,960	85.6%
4000+ g	60	4.1%	178	5.6%	238	5.1%
Gestational age						
< 28 weeks	20	1.4%	27	0.9%	47	1.0%
< 37 weeks	128	8.8%	247	7.9%	375	8.2%
37-42 weeks	1,298	89.7%	2,853	91.2%	4,151	90.8%
43+ weeks	1	--[5]	0	0.0%	1	--[5]
Plurality						
Singleton	1,455	98.8%	3,118	98.5%	4,573	98.6%
Multiple birth	18	1.2%	48	1.5%	66	1.4%

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. For state total row, percentages are based on total births to women ages 15-19. For the rest of the table, percentages are based on all births for a given age group and characteristic. 2. Percents are based on state total of the age group. 3. Based on Adequacy of Prenatal Care Utilization (APNCU) Index. 4. Adequate Total = Adequate Basic + Adeq. Intensive. 5. Calculations based on fewer than five events are excluded. 6. Number of live births including the current birth.

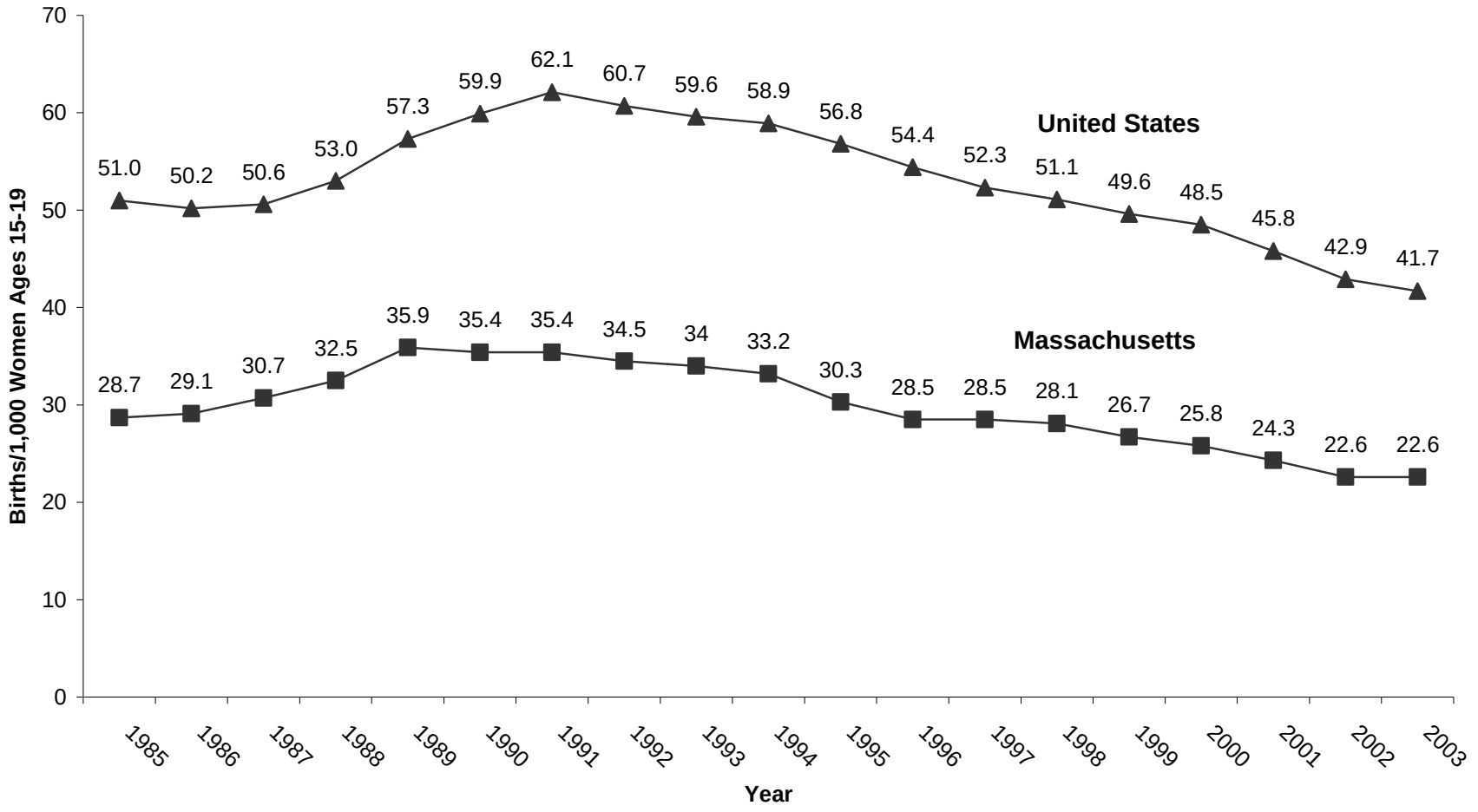
Figure 6. Comparison of Teen vs. Adult Births, Selected Characteristics, Massachusetts: 2003



NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

Definitions: Unmarried = marital status at time of birth. Adequate Prenatal Care = based on Adequacy of Prenatal Care Utilization (APNCU) Index. See Appendix (Glossary and Technical Notes) for more details on the APNCU Index. Preterm Birth = gestational age less than 37 weeks, based on clinical estimate of gestational age. Low Birthweight = less than 2,500 grams (5.5 lbs.).

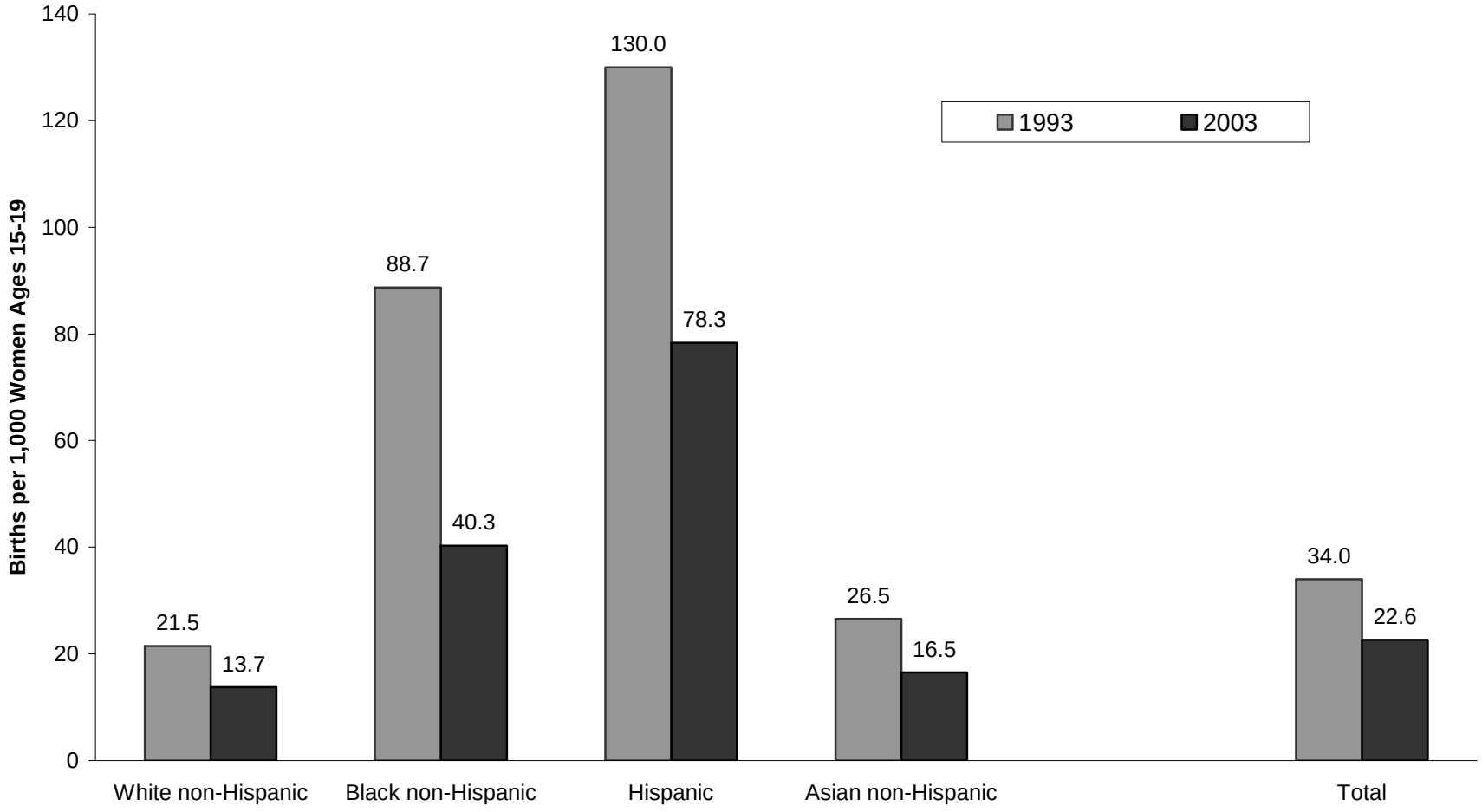
Figure 7. Trend in Birth Rates Among Women Ages 15-19, Massachusetts and the United States: 1985-2003



Teen birth rate is number of births to women ages 15-19 per 1,000 women ages 15-19

Data sources: 1) U.S. annual natality data (NCHS) and 1990 U.S. Census data (population data used in denominators); 2) Massachusetts: annual birth data files, decennial Census counts (1990, 2000) and intercensal population estimates based on MISER (Massachusetts Institute for Social and Economic Research) population estimates for 1991 through 1998 and DPH population estimates for 1999. 2000-2003 birth rates are calculated using DPH 2000 population estimates, based on U.S. Census 2000 population counts.

Figure 8. Birth Rates Among Women Ages 15-19 by Mother's Race/Hispanic Ethnicity, Massachusetts: 1993 and 2003



Teen birth rate is number of births to women ages 15-19 per 1,000 women ages 15-19

Population data sources: denominators for 1990 rates are based on the 1990 U.S. Census. 2003 birth rates are calculated using DPH 2000 population estimates, based on U.S. Census 2000 population counts.

Table 11. Resident Teen Birth Characteristics, 30 Largest Municipalities[1], Massachusetts: 2003

Municipality	Total Population Rank	Female Population, age 15-19	Number of Teen Births	Teen Birth Rate[2]	Mother's Race and Hispanic Ethnicity (% of teen births)			
					White non-Hispanic	Black non-Hispanic	Hispanic	Asian or other[3]
State Total		**205,277**	**4,639**	**22.6**	**47.7**	**11.8**	**33.5**	**7.0**
Arlington	29	767	7	9.1	57.1	28.6	14.3	0.0
Attleboro	30	1,151	45	39.1	68.9	4.4	8.9	17.8
Barnstable	25	1,287	29	22.5	65.5	6.9	17.2	10.3
Boston	1	22,240	573	25.8	11.7	41.4	38.9	7.7
Brockton	6	3,304	148	44.8	33.8	26.4	14.9	25.0
Brookline	17	1,382	1	--[5]	--[5]	--[5]	--[5]	--[5]
Cambridge	5	3,733	27	7.2	37.0	25.9	25.9	11.1
Chicopee	21	1,809	59	32.6	57.6	3.4	37.3	1.7
Fall River	8	2,915	163	55.9	77.3	4.3	9.2	9.2
Framingham	14	1,925	38	19.7	44.7	5.3	47.4	2.6
Haverhill	16	1,793	53	29.6	67.9	3.8	24.5	3.8
Lawrence	13	2,847	236	82.9	7.2	1.7	89.0	2.1
Lowell	4	3,913	174	44.5	28.7	1.7	32.8	36.8
Lynn	9	2,990	145	48.5	32.4	9.0	43.4	15.2
Malden	18	1,391	29	20.8	72.4	6.9	6.9	13.8
Medford	20	1,749	15	8.6	53.3	20.0	26.7	0.0
Methuen	28	1,264	29	22.9	37.9	3.4	51.7	6.9
New Bedford	7	2,978	169	56.7	56.8	3.6	33.7	5.3
Newton	11	3,411	3	--[5]	--[5]	--[5]	--[5]	--[5]
Peabody	24	1,300	24	18.5	70.8	0.0	29.2	0.0
Pittsfield	27	1,361	72	52.9	77.8	11.1	9.7	1.4
Plymouth	23	1,577	28	17.8	85.7	3.6	10.7	0.0
Quincy	10	1,950	43	22.1	53.5	14.0	11.6	18.6
Revere	26	1,215	50	41.2	50.0	6.0	26.0	18.0
Somerville	12	2,087	46	22.0	39.1	19.6	39.1	2.2
Springfield	3	6,037	479	79.3	14.2	22.3	61.4	1.9
Taunton	19	1,652	58	35.1	77.6	5.2	13.8	3.4
Waltham	15	2,251	26	11.6	46.2	7.7	42.3	3.8
Weymouth	22	1,331	28	21.0	89.3	0.0	3.6	7.1
Worcester	2	6,918	263	38.0	49.8	5.7	37.3	7.2

Table 11 (cont.). Resident Teen Birth Characteristics, 30 Largest Municipalities, Massachusetts: 2003

Municipality	Public payment for prenatal care[4] (%)	Unmarried (%)	Low Birthweight[6] (%)	Preterm[7] (%)	Adequacy of Prenatal Care[8]			
					Adequate Intensive	Adequate Basic	Intermediate	Inadequate
State Total	**75.3**	**92.3**	**9.3**	**9.2**	**34.0**	**38.2**	**9.4**	**18.4**
Arlington	--[5]	85.7	14.3	--[5]	71.4	--[5]	--[5]	--[5]
Attleboro	67.5	93.3	8.9	--[5]	28.9	33.3	15.6	22.2
Barnstable	69.0	86.2	13.8	--[5]	17.2	58.6	--[5]	17.2
Boston	75.9	94.9	7.7	8.1	32.2	44.3	8.0	15.5
Brockton	84.7	92.6	8.8	10.8	36.7	35.4	8.8	19.1
Brookline	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]
Cambridge	57.7	96.3	11.1	--[5]	46.2	34.6	--[5]	--[5]
Chicopee	81.4	93.2	8.5	8.6	20.3	67.8	--[5]	11.9
Fall River	82.9	91.4	7.5	8.0	64.0	14.3	3.7	18.0
Framingham	64.9	68.4	13.2	--[5]	42.1	39.5	--[5]	13.2
Haverhill	59.6	96.2	13.2	9.6	47.2	34.0	--[5]	17.0
Lawrence	71.5	91.5	12.3	11.9	35.2	47.9	5.9	11.0
Lowell	83.7	92.5	13.8	9.8	21.4	28.9	20.2	29.5
Lynn	80.4	89.0	7.6	6.9	36.4	30.8	10.5	22.4
Malden	72.4	75.9	13.8	17.2	37.9	31.0	--[5]	20.7
Medford	60.0	73.3	6.7	--[5]	--[5]	33.3	--[5]	40.0
Methuen	44.8	86.2	6.9	--[5]	37.9	31.0	--[5]	20.7
New Bedford	79.6	95.3	12.1	13.8	31.7	41.8	9.5	17.1
Newton	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]	--[5]
Peabody	65.2	100.0	33.3	25.0	29.2	25.0	--[5]	33.3
Pittsfield	83.3	97.2	11.1	12.7	12.5	41.7	27.8	18.1
Plymouth	51.9	96.4	3.6	--[5]	17.9	46.4	--[5]	21.4
Quincy	78.6	90.7	7.0	--[5]	40.5	42.9	--[5]	11.9
Revere	67.4	88.0	2.0	--[5]	50.0	14.0	--[5]	34.0
Somerville	89.1	91.3	8.7	13.0	32.6	37.0	--[5]	21.7
Springfield	91.6	95.4	9.8	11.8	30.5	36.7	11.2	21.7
Taunton	75.9	91.4	6.9	10.3	29.8	38.6	12.3	19.3
Waltham	60.0	88.5	0.0	--[5]	28.0	40.0	--[5]	24.0
Weymouth	50.0	89.3	14.3	--[5]	42.3	19.2	--[5]	34.6
Worcester	77.8	94.7	11.4	9.5	30.8	39.2	16.0	14.1

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. The 30 largest municipalities are the cities and towns in Massachusetts with the largest populations according to DPH 2000 population estimates, based on the U.S. Census 2000 population counts (see Technical Notes in Appendix). 2 Birth rates represent the number of births per 1,000 females age 15-19. 3 Mothers who designated themselves as Asian, American Indian, or Other. 4. See Glossary under "Prenatal Care Payment Source." 5. Calculations based on fewer than five teen births overall are excluded. 6. Less than 2,500 grams or 5.5 pounds. 7. Less than 37 weeks gestational age. 8. Based on Adequacy of Prenatal Care Utilization (APNCU) Index. Please see Glossary and Technical Notes in the Appendix for definitions of index and adequacy categories.

Table 12. Trends in Teen Birth Rates for Selected Communities[1], Ranked by 2003 Teen Birth Rate[2], Massachusetts: 2003, 2002, 1993

		2003		2002		1993[3]	
2003 Rank	**Municipality**	**Number of Teen Births**	**Teen Birth Rate**	**Number of Teen Births**	**Teen Birth Rate**	**Number of Teen Births**	**Teen Birth Rate**
	State Total	4,639	22.6	**4,642**	**22.6**	**6,555**	**31.7**
1	Holyoke	139	91.9	124	82.0	199	137.5
2	Lawrence	236	82.9	227	79.7	304	110.5
3	Springfield	479	79.3	423	70.1	567	95.3
4	Southbridge	37	66.5	28	50.4	51	87.6
5	Chelsea	68	61.7	90	81.7	81	88.5
6	New Bedford	169	56.7	175	58.8	260	75.4
7	Fall River	163	55.9	158	54.2	179	56.0
8	Pittsfield	72	52.9	61	44.8	49	32.0
9	Fitchburg	75	49.4	67	44.1	100	56.2
10	Lynn	145	48.5	162	54.2	191	78.2
11	Brockton	148	44.8	163	49.3	207	65.0
12	Lowell	174	44.5	228	58.3	264	69.4
13	Revere	50	41.2	51	42.0	32	30.0
14	Everett	41	39.4	30	28.8	27	26.6
15	Attleboro	45	39.1	32	27.8	56	48.5
16	Worcester	263	38.0	226	32.7	395	58.2
17	Leominster	43	35.2	39	32.0	64	57.6
18	Taunton	58	35.1	57	34.5	88	56.5
19	Chicopee	59	32.6	60	33.2	63	33.7
20	Haverhill	53	29.6	67	37.4	83	53.3
21	Salem	34	27.9	25	20.5	44	34.6
22	Boston	573	25.8	664	29.9	1005	46.6
23	Quincy	43	22.1	31	15.9	47	20.2
24	Somerville	46	22.0	50	24.0	65	29.7
25	Framingham	38	19.7	41	21.3	40	17.9

1. Selected communities include the 25 Massachusetts cities and towns with the greatest number of teen births. Ranking is by 2003 teen birth rate. 2. Rates are per 1,000 females ages 15-19 per city/town.
3. Source for 1993 births and rates: Massachusetts Community Health Information Profile (MassCHIP), MDPH, v2.8 r270, January 2003; natality dataset and MISER 1993 population estimate.

CHAPTER 3

FETO-INFANT AND MATERNAL MORTALITY

Overall Changes in the Infant Mortality Rate

In 2003, there were 383 infant deaths (deaths of children less than one year of age) among Massachusetts residents, 12 fewer infant deaths than in 2002, and the second lowest number of infant deaths in Massachusetts since 1980 (Table 13A).

The infant mortality rate (IMR) in 2003 was 4.8 deaths per 1,000 live births, which was slightly lower than the 2002 rate of 4.9, and a 31% decrease since 1990. **The 2003 IMR is the second lowest rate ever recorded for the state** (Table 13A).

The **infant mortality rate (IMR)** in Massachusetts (4.8) was **30% lower** than the preliminary 2003 U.S. IMR (6.9) (National Vital Statistics Report, Vol. 53, No. 15, February 28, 2005, p. 3).

Race and Ethnicity Patterns in Infant Mortality Rates

The 2003 IMR for white infants (both Hispanic and non-Hispanic) was 4.3 deaths per 1,000 live births in 2003, which was a 4% decline from the previous year (Table 13A). The IMR for black infants (Hispanic and non-Hispanic) was 11.8 deaths per 1,000 live births, which was a 6% increase from the 2002 rate.

Since 1980, there has been a substantial decline in IMRs among black and white infants. From 1980 to 2003, the IMR decreased by 56% for whites and 37% for blacks. **However, the IMR for black infants, 11.8 deaths per 1,000 live births, has been consistently more than twice as high as the IMR for white infants during this time period** (Figure 9).

Black non-Hispanics continued to have the highest IMR (12.7 per 1,000 live births) among the race/Hispanic origin groups. Black non-Hispanic infants died at more than 3 times the rate of white non-Hispanic infants, and Hispanic infants died at about 1.4 times the rate of white non-Hispanic infants. Asian infants had the lowest infant mortality rate of all groups in 2003 with an IMR of 2.7 deaths per 1,000 live births (Table 13B). However, caution should be used when interpreting this rate, since it is based on a small number of deaths.

The white non-Hispanic IMR remained unchanged since 2002 at 4.1 deaths. The IMR decreased by 20% for Hispanics (7.0 to 5.6), and by 10% for Asians (3.0 to 2.7). The IMR for Black non-Hispanics increased 9%, from 11.6 in 2002 to 12.7 deaths per 1000 live births in 2003.

Neonatal and Post Neonatal Mortality Rates

Neonatal and post neonatal are elements of the total IMR. Neonatal mortality is defined as deaths of infants fewer than 28 days old, and post neonatal mortality is defined as deaths of infants between 28 and 364 days old.

The overall neonatal mortality rate was 3.6 deaths per 1,000 live births in 2003, which is a decrease of 3% from the 2002 neonatal mortality rate of 3.7 (Table 13B).

As was true for infant mortality, neonatal mortality differs by race/ethnicity groups. The neonatal mortality rate increased by 16% for black non-Hispanics from 8.2 in 2002 to 9.5 in 2003. The rate for Hispanics decreased by 25%, from 5.2 in 2002 to 3.9 in 2003,and the rate for white non-Hispanics decreased by 3%, from 3.2 in 2002 to 3.1 in 2003 (Table 13B).

The overall post neonatal mortality rate was 1.2 in 2003, which was the same as it was in 2002 (Table 13B). The post neonatal mortality rate for black non-Hispanic infants decreased by 6% from 3.4 in 2002 to 3.2 in 2003. The post neonatal mortality rate for Hispanic infants decreased 5% in 2003, from 1.8 deaths per 1,000 live births to 1.7 in 2003.

Trends in the Time of Infant Deaths

In 2003, three-fourths of all infant deaths occurred in the first 27 days of life, the neonatal period. From 1990 to 2003, the percentage of all infant deaths that occurred in the post neonatal period (28-364 days) declined from 31% to 26%. During the same time period, the percentage of infant deaths that occurred in the very early neonatal period (within the first day after birth) rose from 44% to 52% of all infant deaths, and the percentage of infant deaths occurring later in the neonatal period (from 1-27 days) remained about the same (23%) (Figure 11).

(Information about the causes of infant death will be available in the upcoming report, *Massachusetts Deaths 2003*.)

Feto-Infant Mortality

Infant mortality is only part of the spectrum of adverse pregnancy outcomes. This year we are broadening our coverage of adverse pregnancy outcomes to include data on stillbirths. A stillbirth is defined as a fetal death 20 weeks or greater gestational age resulting in the delivery of an infant that does not breathe or show any other evidence of life, such as a heart beat, and does not respond to resuscitation[9].

The State Law of Massachusetts[10] mandates the reporting of a stillbirth that occurs in a hospital at twenty weeks' gestation or more, or which weighs three hundred and fifty grams or more. The Registry of Vital Records and Statistics maintains a file of fetal deaths for each calendar year. Feto-infant mortality is the term used for combined fetal and infant deaths.

Birthweight-Specific Feto-Infant Mortality

Birthweight is one of the most important predictors of survival.[11] In Massachusetts, the highest feto-infant mortality rates are among the lowest birthweight categories. Fetuses or infants weighing less than 500 grams (1 pound and 2 ounces) have less than a 6% possibility of surviving their first year, compared with infants weighing 2,500 grams or more (five and one-half pounds), who have a greater than 99% chance of surviving their first year. Table 13C presents the birthweight-specific feto-infant mortality rates for Massachusetts from 1998 to 2003. Feto-infant mortality rates are greatest for birthweights less than 500 grams. The feto-infant mortality rate for this group in 2003 is 943.5 deaths per 1,000 live births plus fetal deaths, that is, fewer than 60 out of 1,000 fetuses or infants weighing less than 500 grams survive one year. On the other hand, more than 99% of infants who weigh five and one-half pound or more survive their first year.

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[9] Hankins, G., Willinger, M., and Spong, C.Y., "Introduction", *Seminars in Perinatology, Stillbirth After 20 Weeks*, Vol.26, No. 1, February 2002.

[10] Massachusetts General Laws, Chapter 111, Section 202, online: http://www.mass.gov/legis/laws/mgl/111-202.htm

[11] *Explaining the 2001-02 Infant Mortality Increase: Data from the Linked Birth/Infant Death Data Set*, M.F. MacDorman, et al, National Vital Statistics report, Volume 53, Number 12, January 24, 2005.

Trends in Feto-Infant Mortality

Table 13C shows the trend in birthweight-specific feto-infant mortality from 1998 to 2003. The rates for the less than 500 gram and the 500-749 gram groups have declined about 5% each since 1998. In fact, the feto-infant mortality rates for all except the "1,000 - 1,249 grams" and "1,250 -1,500 grams" groups have experienced declines. The "1,000-1,249" and "1,250-1,500" groups' feto-infant mortality rates have both increased by about 50% since 1993.

While the infant mortality rate (IMR) has decreased slightly from 2002 to 2003 (4.9 per 1,000 live births to 4.8 per 1,000 live births), the feto-infant mortality rate has *increased* from 9.1 feto-infant deaths per 1,000 fetal deaths and live births in 2002 to 10.3 in 2003, which is an increase of 12.5%. This year's increase was a change in direction of the feto-infant mortality rate, which had been decreasing every year since 1998.

Figure 12 illustrates the contribution of fetal and infant deaths to the overall feto-infant morality rate. For 2003, fetal deaths accounted for the overall increase in the feto-infant mortality rate, since the infant death rate[12] remained the same as it was in 2002 (4.5 deaths per 1,000 live births and fetal deaths). While the decline in the feto-infant mortality rate from 1998 and 2002 was due to decreases in both fetal and infant mortality rates, the increase from last year to this year was due to the increase in fetal deaths reported in Massachusetts.

Feto-Infant Deaths by Birthweight and Gestational Age

Table 13D shows the number and proportion (percent of the combined feto-infant deaths for each year) that: 1) occurred at fewer than 24 weeks gestation or weighing less than 500 grams; and 2) occurred at 24 weeks or later and weighed 500 grams or more. It can be seen that from 1998 to 2002, fetal deaths made up between 51 to 54% of the combined feto-infant deaths. In 2003, fetal deaths contributed 56% to the overall deaths, almost 10% more than in 2002 (51%). In 2003, there were decreases in all infant deaths regardless of gestational age and birthweight and concomitant increases in fetal deaths regardless of birthweight and gestational age. The largest increase in proportion from 2002 to 2003 was in fetal deaths that occurred at fewer than 24 weeks gestation or weighing less than 500 grams (22% in 2002 to 26% in 2003), and the largest decrease in proportion was that of infant deaths that that occurred at 24 weeks or later and weighed 500 grams or more (24% in 2002 to 21% in 2003).

Pregnancy-Associated and Maternal Mortality Ratios

In 2003, there were 15 pregnancy-associated deaths, including 4 maternal deaths (Fig. 13). A pregnancy-associated death is the death of a woman while pregnant or within one year of the termination of pregnancy, irrespective of cause. The deaths of women who die from a cause related to pregnancy or childbirth either during pregnancy or up to 42 days after pregnancy termination are categorized as maternal deaths and are a subset of pregnancy-associated deaths. (See technical notes for further information.)

[12] Note that the infant death rate expressed here differs from the infant mortality rate (IMR) in that the denominator for the infant death rate here is live births *plus fetal deaths*, unlike the standard IMR, which uses live births as the denominator.

The 2003 pregnancy-associated mortality ratio (PAMR) was 18.5 deaths per 100,000 live births and the maternal mortality ratio (MMR) was 4.9 per 100,000 live births (Figure 13). Since 1990, the annual PAMR fluctuated from a low of 18.0 in 1990 to a high of 32.8 in 2001. However, due to the small number of cases, the differences are not statistically significant.

Table 13A. Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race[1], Massachusetts: 1980-2003

INFANT MORTALITY (less than one year of age)

	State Total[2]		White		Black		Asian/Other[3]	
Year	**n**	**Rate[4]**	**n**	**Rate[4]**	**n**	**Rate[4]**	**n**	**Rate**
1980	748	10.3	655	9.8	87	18.6	5	4.6
1981	710	9.6	616	9.1	85	18.2	8	6.1
1982	764	10.1	656	9.4	102	21.3	5	3.3
1983	682	9.0	579	8.3	89	19.0	12	7.4
1984	699	8.9	601	8.4	82	16.4	13	7.5
1985	745	9.1	608	8.1	126	23.8	11	6.1
1986	695	8.4	560	7.5	123	22.0	11	4.6
1987	608	7.2	486	6.4	110	17.5	12	4.5
1988	693	7.9	546	7.0	133	19.5	13	3.8
1989	697	7.6	549	6.8	131	17.7	17	4.8
1990	649	7.0	519	6.4	106	13.7	24	6.5
1991	577	6.5	461	6.0	102	13.8	14	3.9
1992	569	6.5	438	5.7	114	15.8	17	4.7
1993	523	6.2	423	5.7	87	12.5	13	3.5
1994	499	6.0	407	5.6	81	12.0	11	2.9
1995	419	5.1	333	4.7	65	10.3	21	5.5
1996	403	5.0	329	4.7	65	10.8	8	2.0
1997	425	5.3	349	5.0	66	10.6	10	2.4
1998	414	5.1	345	4.9	59	9.3	10	2.3
1999	418	5.2	334	4.8	75	11.4	9	1.9
2000	377	4.6	280	4.0	76	11.7	19	3.6
2001	407	5.0	314	4.5	77	11.7	16	3.0
2002	397	4.9	306	4.5	74	11.1	17	2.9
2003	383	4.8	290	4.3	78	11.8	15	2.6

Table 13A. (cont'd) Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race[1], Massachusetts: 1980-2003

NEONATAL MORTALITY (birth to 27 days)

	State Total[2]		White		Black		Asian/Other[3]	
Year	**n**	**Rate[4]**	**n**	**Rate[4]**	**n**	**Rate[4]**	**n**	**Rate[4]**
1980	550	7.6	483	7.2	62	13.3	5	4.6
1981	510	6.9	442	6.5	59	12.4	5	3.8
1982	573	7.6	494	7.1	75	15.7	3	--[5]
1983	482	6.3	411	5.9	63	13.4	7	4.3
1984	472	6.0	411	5.8	49	9.8	8	4.6
1985	538	6.6	447	6.0	85	16.0	5	2.8
1986	478	5.8	383	5.2	89	15.9	5	2.1
1987	432	5.1	343	4.6	80	12.7	9	3.4
1988	477	5.4	383	4.9	87	12.8	6	1.8
1989	479	5.2	376	4.7	95	12.8	8	2.3
1990	446	4.8	347	4.3	80	10.3	9	5.1
1991	401	4.5	319	4.1	72	9.8	10	2.8
1992	415	4.8	325	4.3	79	10.9	11	3.1
1993	375	4.4	300	4.1	66	9.5	9	2.4
1994	349	4.2	280	3.8	60	8.9	9	2.4
1995	298	3.6	237	3.3	50	7.9	11	2.9
1996	290	3.6	249	3.5	35	5.8	5	1.2
1997	323	4.0	271	3.9	45	7.2	7	1.7
1998	315	3.9	261	3.7	47	7.4	7	1.6
1999	332	4.1	265	3.8	61	9.3	6	1.3
2000	288	3.5	214	3.1	58	8.9	14	2.7
2001	308	3.8	239	3.5	59	9.0	10	1.9
2002	299	3.7	235	3.4	51	7.6	13	2.2
2003	285	3.6	217	3.2	58	8.8	10	1.8

Table 13A (cont'd) Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race[1], Massachusetts: 1980-2003

POST NEONATAL MORTALITY (28-364 days)

	State Total[2]		White		Black		Asian/Other[3]	
Year	n	Rate[4]	n	Rate[4]	n	Rate[4]	n	Rate[4]
1980	198	2.7	172	2.6	25	5.3	0	0.0
1981	200	2.7	174	2.6	26	5.8	3	--[5]
1982	191	2.5	162	2.3	27	5.6	2	--[5]
1983	200	2.7	168	2.4	26	5.6	5	3.1
1984	227	2.9	190	2.6	33	6.6	5	2.9
1985	207	2.5	161	2.1	41	7.8	6	3.3
1986	217	2.6	177	2.3	34	6.1	6	2.5
1987	176	2.1	143	1.8	30	4.8	3	--[5]
1988	216	2.5	163	2.1	46	6.7	7	2.0
1989	218	2.4	173	2.1	36	4.9	9	2.5
1990	203	2.2	172	2.1	26	3.4	5	1.4
1991	176	2.0	142	1.8	30	4.1	4	--[5]
1992	154	1.8	113	1.5	35	4.8	6	1.7
1993	148	1.7	123	1.7	21	3.0	4	--[5]
1994	150	1.8	127	1.7	21	3.1	2	--[5]
1995	121	1.5	96	1.3	15	2.4	10	2.6
1996	113	1.4	80	1.1	30	5.0	3	--[5]
1997	102	1.3	78	1.1	21	3.4	3	--[5]
1998	99	1.2	84	1.2	12	1.9	3	--[5]
1999	86	1.1	69	1.0	14	2.1	3	--[5]
2000	89	1.1	66	0.9	18	2.8	5	1.0
2001	99	1.2	75	1.1	18	2.7	6	1.1
2002	98	1.2	71	1.0	23	3.4	4	--[5]
2003	98	1.2	73	1.1	20	3.0	5	0.9

1. Hispanic origin could not be identified from the Massachusetts death certificate before 1989; thus, Hispanic trend data are not available. Most Hispanics are included in the race category of white. Hispanic infant mortality data for the years 1990 through 2003 are presented in Table 12B. 2. Deaths of infants of unknown race are included in the total calculation. For rate computations, infants of unknown race are allocated into the race categories according to the distribution of births of known race. 3. Other: American Indian and Other races. 4. Rates are expressed per 1,000 live births. 5. Calculations based on fewer than five events are excluded.

Table 13B. Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race and Hispanic Ethnicity, Massachusetts: 1990-2003

INFANT MORTALITY (less than one year of age)

	State Total[1]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[2]	
Year	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**
1990	649	7.0	442	6.1	98	13.7	77	9.1	24	7.0	8	9.5
1991	577	6.5	381	5.5	101	15.0	80	9.4	14	4.2	1	--[4]
1992	569	6.5	371	5.5	110	16.4	67	7.9	16	4.9	5	5.1
1993	523	6.2	346	5.3	84	13.1	77	9.3	13	3.9	3	--[4]
1994	499	6.0	343	5.3	79	12.6	64	7.6	8	2.4	5	5.3
1995	419	5.1	275	4.4	65	11.1	58	7.2	19	5.5	2	--[4]
1996	403	5.0	289	4.7	63	11.4	40	5.1	8	2.2	2	--[4]
1997	425	5.3	294	4.8	64	11.7	55	6.7	10	2.6	2	--[4]
1998	414	5.1	287	4.6	59	10.6	58	6.7	10	2.7	0	0.0
1999	418	5.2	285	4.7	72	12.3	49	5.5	8	1.9	4	--[4]
2000	377	4.6	232	3.8	74	12.8	48	5.2	19	4.1	4	--[4]
2001	407	5.0	245	4.1	71	12.1	69	7.3	15	3.1	7	4.1
2002	397	4.9	239	4.1	69	11.6	67	7.0	16	3.0	6	3.8
2003	383	4.8	235	4.1	75	12.7	55	5.6	14	2.7	4	--[4]

NEONATAL MORTALITY (birth to 27 days)

	State Total[1]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[2]	
Year	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**
1990	446	4.8	298	4.1	75	10.5	49	5.8	19	5.5	5	5.5
1991	401	4.5	266	3.9	72	10.7	53	6.2	10	3.0	0	0.0
1992	415	4.8	274	4.0	76	11.4	51	6.0	10	3.0	4	--[4]
1993	375	4.4	245	3.7	64	10.0	55	6.7	9	2.7	2	--[4]
1994	349	4.2	240	3.7	58	9.3	40	4.7	7	2.1	4	--[4]
1995	298	3.6	198	3.1	50	8.5	39	4.8	10	2.9	1	--[4]
1996	290	3.6	222	3.6	34	6.2	27	3.5	5	1.4	1	--[4]
1997	323	4.0	228	3.7	44	8.0	43	5.2	7	1.8	1	--[4]
1998	315	3.9	218	3.5	47	8.5	43	5.0	7	1.9	0	0.0
1999	332	4.1	226	3.7	58	9.9	39	4.4	5	1.2	4	--[4]
2000	288	3.5	177	2.9	57	9.9	37	4.0	14	3.0	3	--[4]
2001	308	3.8	190	3.2	56	9.5	49	5.2	10	2.1	3	--[4]
2002	299	3.7	185	3.2	49	8.2	50	5.2	13	2.4	2	--[4]
2003	285	3.6	179	3.1	56	9.5	38	3.9	10	1.9	2	--[4]

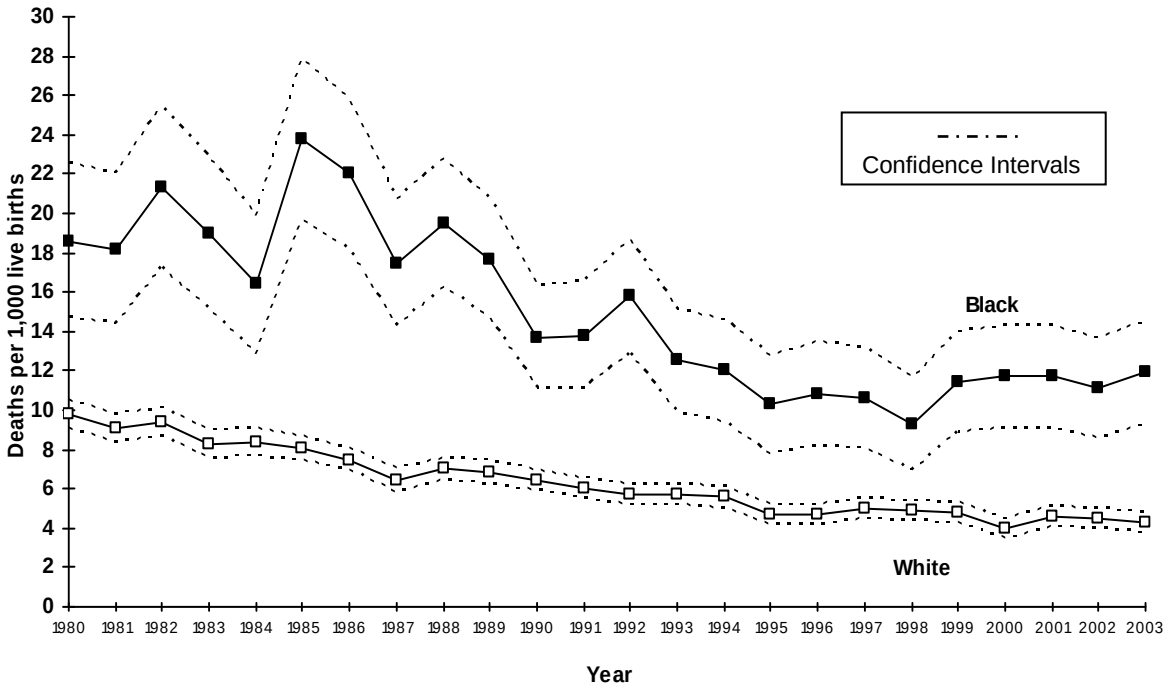
Table 13B. (cont'd) Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race and Hispanic Ethnicity, Massachusetts: 1990-2003

POST NEONATAL MORTALITY (28-364 days)

	State Total[1]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[2]	
Year	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**	**n**	**Rate[3]**
1990	203	2.2	144	2.0	23	3.2	28	3.3	5	1.5	3	--[4]
1991	176	2.0	115	1.7	29	4.3	27	3.2	4	--[4]	1	--[4]
1992	154	1.8	97	1.4	34	5.1	16	1.9	6	1.8	1	--[4]
1993	148	1.7	101	1.5	20	3.1	22	2.7	4	--[4]	1	--[4]
1994	150	1.8	103	1.6	21	3.3	24	2.8	1	--[4]	1	--[4]
1995	121	1.5	77	1.2	15	2.6	19	2.3	9	2.6	1	--[4]
1996	113	1.4	67	1.1	29	5.3	13	1.7	3	--[4]	1	--[4]
1997	102	1.3	66	1.1	20	3.7	12	1.5	3	--[4]	1	--[4]
1998	99	1.2	69	1.1	12	2.2	15	1.7	3	--[4]	0	0.0
1999	86	1.1	59	1.0	14	2.4	10	1.1	3	--[4]	0	0.0
2000	89	1.1	55	0.9	17	2.9	11	1.2	5	1.1	1	--[4]
2001	99	1.2	55	0.9	15	2.6	20	2.1	5	1.0	4	--[4]
2002	98	1.2	54	0.9	20	3.4	17	1.8	3	--[4]	4	--[4]
2003	98	1.2	56	1.0	19	3.2	17	1.7	4	--[4]	2	--[4]

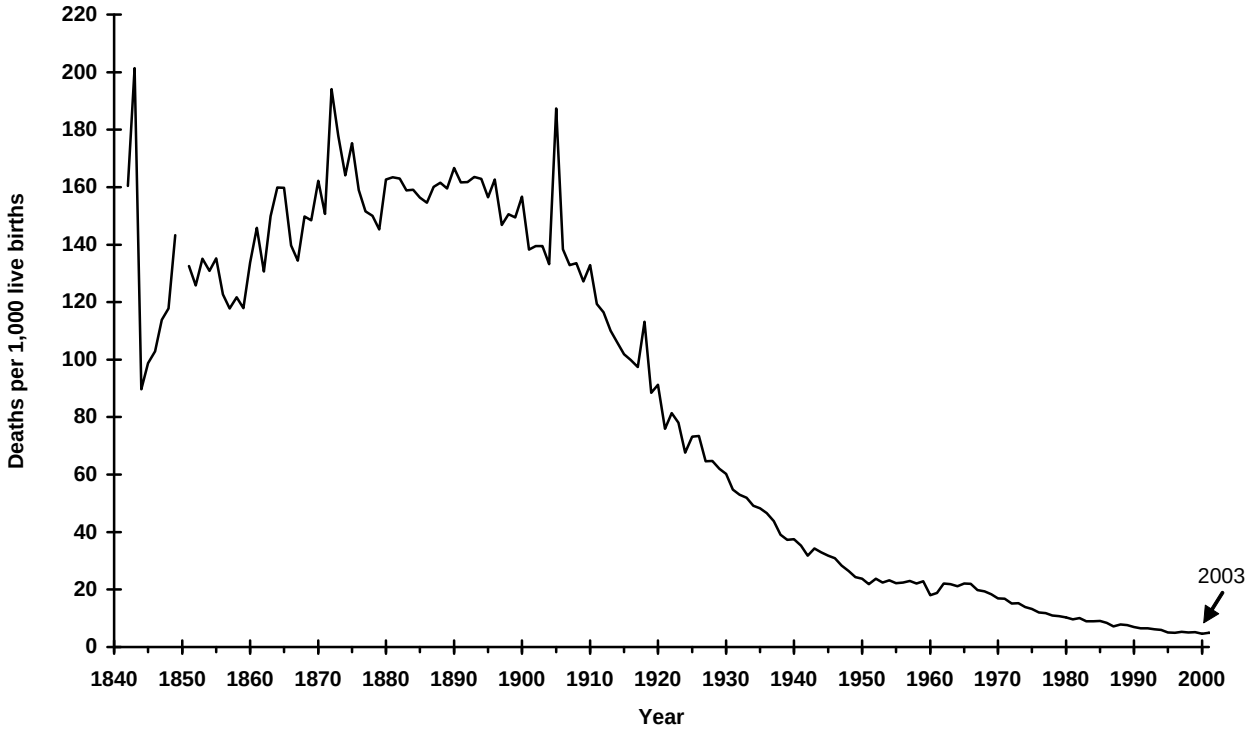
1. Deaths of infants of unknown race are included in the total calculation. For rate computations, births of infants of unknown race are allocated into the race categories according to the distribution of births of known race. 2. Other: American Indian and Other races. 3. Rates are expressed per 1,000 live births.
4. Calculations based on fewer than five events are excluded.

Figure 9. Infant Mortality Rates and 95% Confidence Intervals[1] by Race[2], Massachusetts: 1980-2003



1. See Appendix for an explanation of confidence intervals.
2. For rate computations, infant births of unknown race are allocated into race categories according to the distribution of the births of known race.
3. On tables and graphs that include data prior to June 1986, the race classifications do not include ethnicity; most Hispanics are included in the race category of whites.

Figure 10. Infant Mortality Rates
Massachusetts: 1842-2003[1]



1. Data not available for 1850.

Figure 11. Trends in the Timing of Infant Deaths
Massachusetts: 1990-2003

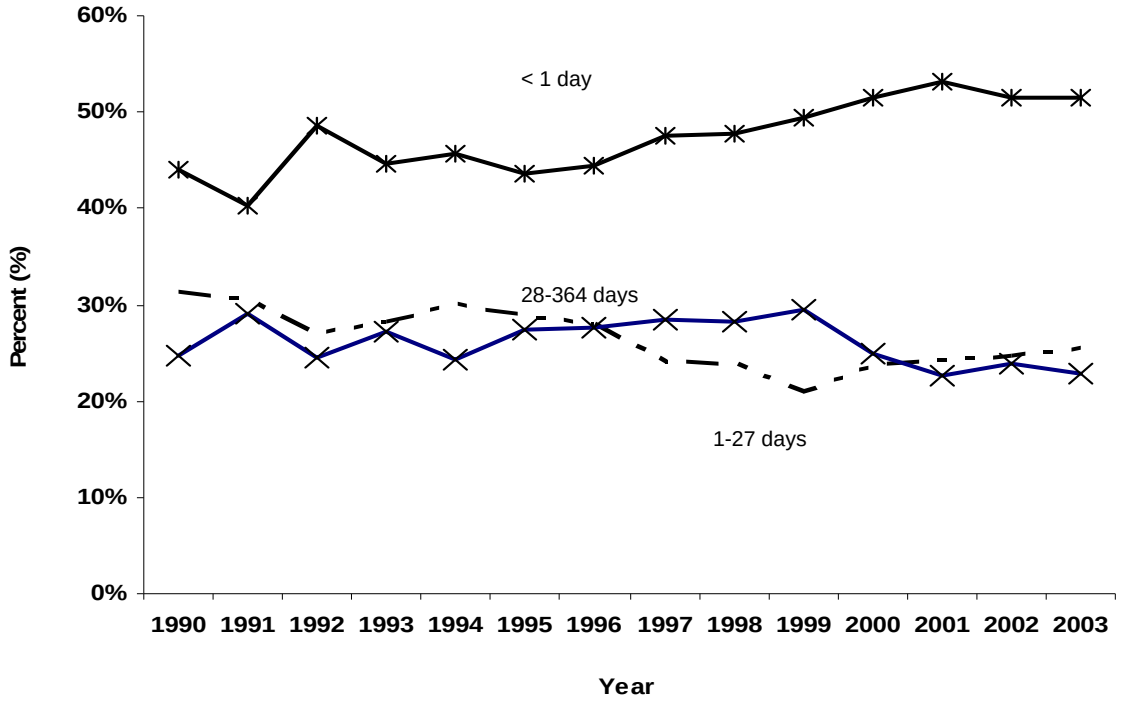
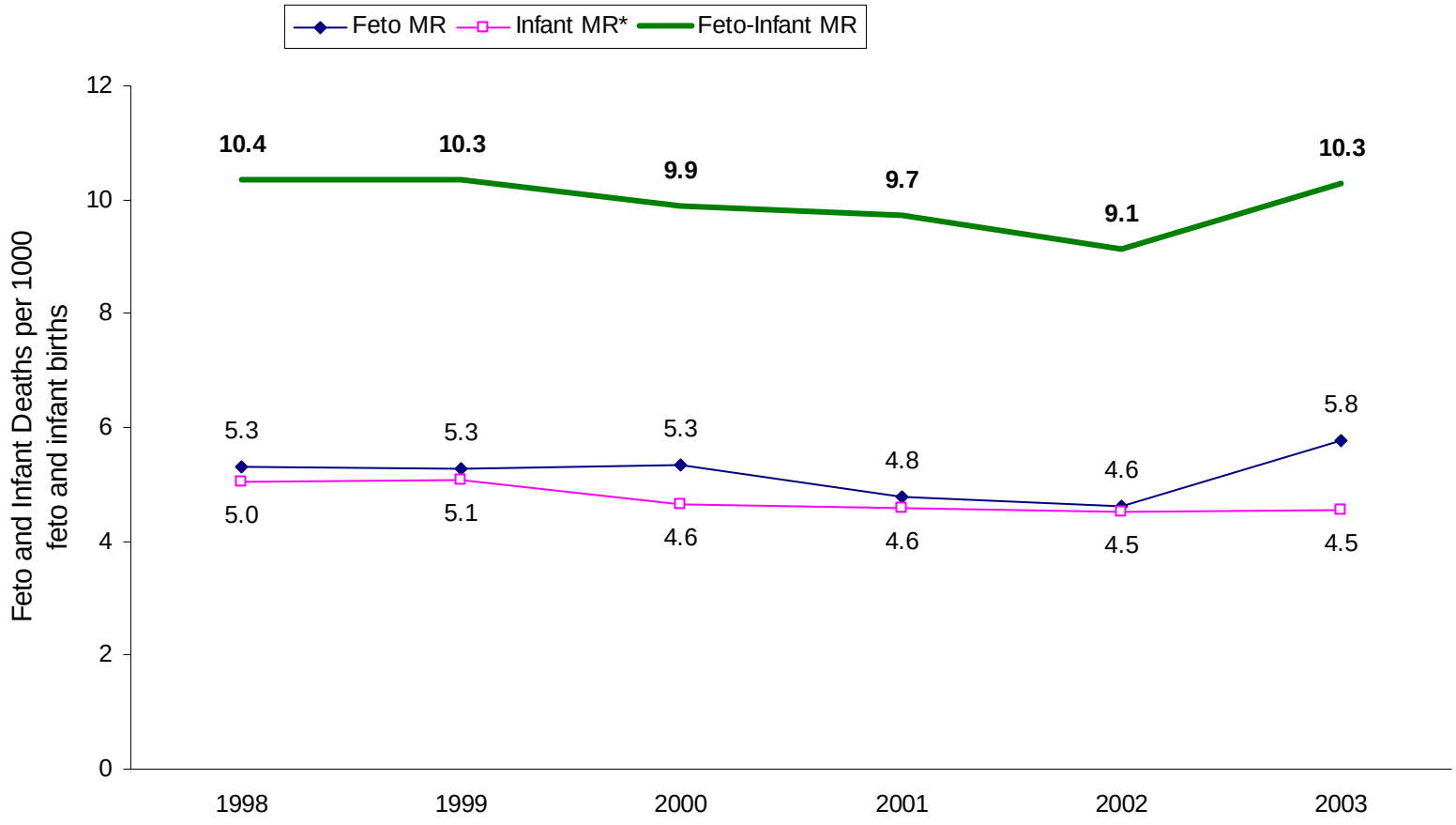


Table 13C. Feto-Infant Mortality Rate by Birthweight, Massachusetts: 1998-2003

Birthweight (in grams)	1998	1999	2000	2001	2002	2003
<500	996.5	962.8	928.0	961.5	938.3	943.5
500-749	553.4	576.5	536.4	503.7	487.0	525.5
750-999	228.8	170.8	247.2	190.7	146.9	188.6
1,000-1,249	85.0	104.9	112.4	136.2	83.0	131.4
1,250-1,499	64.0	64.4	69.0	90.6	84.6	95.8
1,500-1,999	48.6	53.9	35.2	42.7	40.3	38.3
2,000-2,499	13.8	10.8	15.2	15.9	12.2	11.9
2,500-4,000	2.6	2.4	2.4	2.3	2.6	2.5
4,001+	2.8	1.8	2.3	2.1	1.5	1.7
Unknown birthweight (N)	*(23)*	*(26)*	*(32)*	*(36)*	*(23)*	*(17)*
State Feto-Infant Rate	**10.4**	**10.3**	**9.9**	**9.7**	**9.1**	**10.3**

* Calculation of Infant Mortality Rate in this section differs from previous section in the inclusion of Fetal deaths in the denominator.

Figure 12. Feto-Infant Mortality Rate
Massachusetts 1998-2003

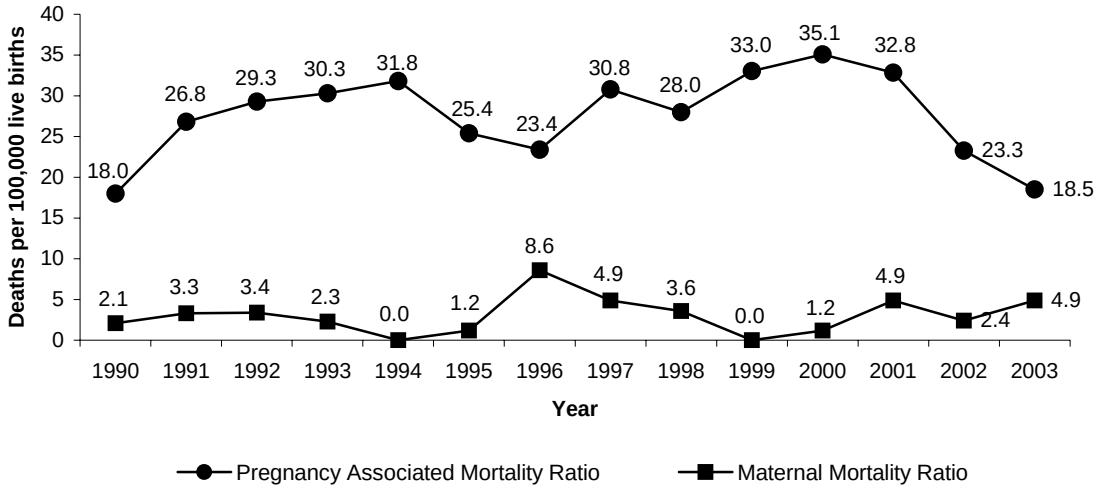


* Calculation of Infant Mortality Rate in this section differs from previous section in the inclusion of fetal deaths in the denominator.
Note: Total Feto, Infant, and Feto-Infant Mortality Rates include cases with unknown birthweight.

Table 13D. Fetal and Infant Deaths by birthweight and gestational age, Massachusetts: 1998-2003

Year	Fetals (<24 wks OR <500 grams)	Fetals (>=24 wks AND >= 500 grams)	Infants (<24 wks OR <500 grams)	Infants (>=24 wks AND >= 500 grams)	Total
1998	216 (25.5%)	219 (25.8)	183 (21.6)	230 (27.1)	848 (100%)
1999	214 (25.4%)	215 (25.6)	196 (23.3)	216 (25.7)	841 (100%)
2000	203 (25.1%)	234 (28.9)	168 (20.7)	205 (25.3)	810 (100%)
2001	174 (22.0%)	214 (27.1)	197 (24.9)	206 (26.0)	791 (100%)
2002	165 (22.3%)	210 (28.3)	185 (25.0)	181 (24.4)	741 (100%)
2003	218 (26.3%)	246 (29.6)	189 (22.8)	177 (21.3)	830 (100%)

Figure 13. Trends in Pregnancy-Associated[1] and Maternal Mortality[2], Massachusetts: 1990-2003



Number of Pregnancy-Associated[1] and Maternal Deaths[2], 1993-2003

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Pregnancy-Associated Deaths[1]	26	27	21	19	25	23	27	29	27	19	15
Maternal Deaths[2]	2	0	1	7	4	3	0	1	4	2	4

NOTE: Ratios shown in graph are per 100,000 live births. Ratios are based on occurrence births, not resident births.

1. Pregnancy-associated death is defined as the death of a woman while pregnant or within one year of termination of pregnancy, irrespective of cause. The pregnancy-associated mortality ratio is the number of pregnancy-associated deaths per 100,000 live occurrence births (see Definition of Rates and Technical Notes in Appendix for further information). 2. Maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes. Maternal mortality ratio is the number of maternal deaths per 100,000 live occurrence births (see Definition of Rates and Technical Notes in Appendix for more information.)

CHAPTER 4

BIRTHWEIGHT AND GESTATIONAL AGE

Birthweight Distribution

In 2003, 7.6% (6,115) of Massachusetts infants were low birthweight (LBW) (less than 2,500 grams or 5.5 pounds), and at the other end of the weight distribution, 10.9% were 4,000 grams (8.8 pounds) or more (Table 14).

The low birthweight percent in 2003 increased 1%, to 7.6% from 7.5% in 2002. LBW continues its increasing trend since 1980[13]. The increase in low birthweight infants can be linked directly to the increase in multiple births and the aging of the population giving birth. The trend in low birthweight infants in Massachusetts is consistent with national trends.

In 2003, 1.4% (1,115) of infants born to Massachusetts resident women were very low birthweight (VLBW) (less than 1,500 grams or 3.3 pounds). This percentage has remained the same since 1999.

The low birthweight rate in Massachusetts was 4% below the U.S. rate of 7.9% (National Vital Statistics Reports, *Births: Preliminary Data for 2003*, Vol. 53, No. 9, November 23, 2004, Table A, p. 2).

Patterns of Birthweight by Race and Ethnicity

The proportion of low birthweight infants varied by mother's race and ethnicity (Table 14). Black non-Hispanic women had the highest proportion of low birthweight infants: 12.1%. Hispanic mothers delivered 8.3% low birthweight infants, Asian mothers, 8.1% low birthweight infants, and white non-Hispanic mothers delivered 7.0% low birthweight infants.

While the percentage of LBW infants increased for the state as a whole, the proportion of low birthweight deliveries in 2003 for black non-Hispanics decreased 4% from 12.6% to 12.1% and the proportion of LBW for Hispanics declined about 1% from 2002, from 8.3 % to 8.2%. The proportion for LBW infants of white non-Hispanic mothers increased 3%, from 6.8% to 7.0%, and the rate for Asians increased 1% from 8.0% to 8.1.

The proportion of very low birthweight infants also varied by mother's race and ethnicity. Black non-Hispanic women had the highest proportion of very low birthweight infants, 3.1%; compared with 1.3% of Hispanics, 1.2% of Asians, and 1.2% of white non-Hispanics (Table 14).

The Massachusetts 2003 low birthweight percentage for black non-Hispanic women, 12.1%, was lower than the U.S. rate for all black women (the U.S. rate includes black Hispanics), 13.5%. The rate of low birthweight for Massachusetts Hispanic women (8.3%) was higher than the corresponding 2003 U.S. rate of 6.7% (National Vital Statistics Reports, *Births: Preliminary Data for 2003*, Vol. 53, No. 9, November 23, 2004, Table A, p. 2). This may be due to the difference in the proportion of Puerto Rican births between the U.S. and Massachusetts, because Puerto Rican infants have tended to have the highest rate of LBW among Hispanic groups . In Massachusetts in 2003, Puerto Rican births made up 44% of the Hispanic births and was the largest birth ethnic

[13] 1980 is the earliest year on which there is a recorded birthweight.

group among Hispanics. On the other hand, in the U.S., Puerto Rican births were 7% of the Hispanic births in 2002[14]. The largest Hispanic ethnic birth group is the U.S. is Mexican, which was 72% of U.S. Hispanic births in 2002. Nationally, the Puerto Rican LBW percentage was 9.8% in 2002 (MA was 10.1 for Puerto Ricans); the LBW percentage for Mexican infants was more that one-third lower at 6.5%. (2002, National Vital Statistics Reports, Vol. 52, No. 10, December 17, 2004). The Massachusetts low birthweight rate for Puerto Rican mothers was 10.1% in 2003 (Table 2B), compared with 11.5% among Puerto Rican mothers in Puerto Rico in 2003 (National Vital Statistics Reports, Vol. 53, No. 9, November 23, 2004, Table C).

White non-Hispanic mothers delivered the highest proportion of high birthweight infants (4,000 grams or 8.8 pounds and more): 12.4% (Table 14). This proportion continues its slow decline since 1999. In 2002, this rate for white non-Hispanic mothers was 12.6%.

Birthweight and Smoking

Cigarette smoking during pregnancy increases the likelihood of delivering a low birthweight infant. During 2003 in Massachusetts, infants born to mothers who smoked during pregnancy were more than one and one-half times as likely to be low birthweight when compared with infants born to non-smoking mothers (11.5% vs. 7.3%; Figure 14). The percentage of low birthweight among infants whose mothers smoked during pregnancy varied by race and Hispanic ethnicity. Hispanic mothers who smoked during pregnancy had the highest percentage of LBW infants (18.3%), followed by black non-Hispanic mothers (15.5%) and Asian mothers (12.2%). Black non-Hispanics had the highest percentage of LBW among mothers who *did not smoke* during pregnancy at 11.9%, which was higher than the state average for mothers who *smoked* during pregnancy.

Birthweight and Age of Mother

In general, the relation between mother's age and percentage low birthweight follows a "U-shaped" distribution: the percentage of low birthweight deliveries is highest among both the youngest mothers (under age 24 years) and the oldest mothers (over age 35 years), while it is lowest for mothers between 25 and 34 years of age (Table 15).

Low Birthweight and Plurality

The increase in low birthweight in Massachusetts over the past decade can be attributed in part to the dramatic increase in multiple births in Massachusetts. If there had been the same number of multiples as in 2002 (instead of 151 fewer), the LBW would have been 7.7%. As it was, there were still more LBW multiples than last year. The percentage of low birthweight (LBW) and very low birthweight (VLBW) rises dramatically for twins and higher order births. In 2003, 5% of singleton births were LBW, whereas 53% of twins, and 93% of higher order births were LBW (Table 16). Similarly, 0.9% of singletons, 9% of twins, and 29% of higher order births were VLBW. The percentage of VLBW singleton infants has remained relatively constant since 1993, while LBW has

[14] The latest national data available stratified by Hispanic groups is 2002.

increased 10% in this group: 4.8% in 1993 to 5.3% in 2003. The percentage of LBW deliveries for twins increased more than 12% since 1993, and it increased 5.4% from 2002 to 2003.

Preterm Deliveries

In 2003, 8.7% (6,963) of infants born to Massachusetts resident women were preterm (premature, that is, born before the mother had completed the 37th week of pregnancy) (Table 17). This was an increase of 2% from the previous year (6,795).

The proportion of preterm births varied by mother's race and ethnicity. Black non-Hispanic women had the highest proportion of preterm infants, 12.0%. Hispanic women had 8.4% preterm births; white non-Hispanic women, 8.6%; and Asian women had the lowest, 7.1% (Table 17).

The percentage of infants delivered very early (before the 28th week of gestation) has remained the same since 1997 at 0.6%. Black non-Hispanic women had the highest proportion of infants delivered very early (1.7%), which was more than double that of any other racial and ethnic group (Table 17).

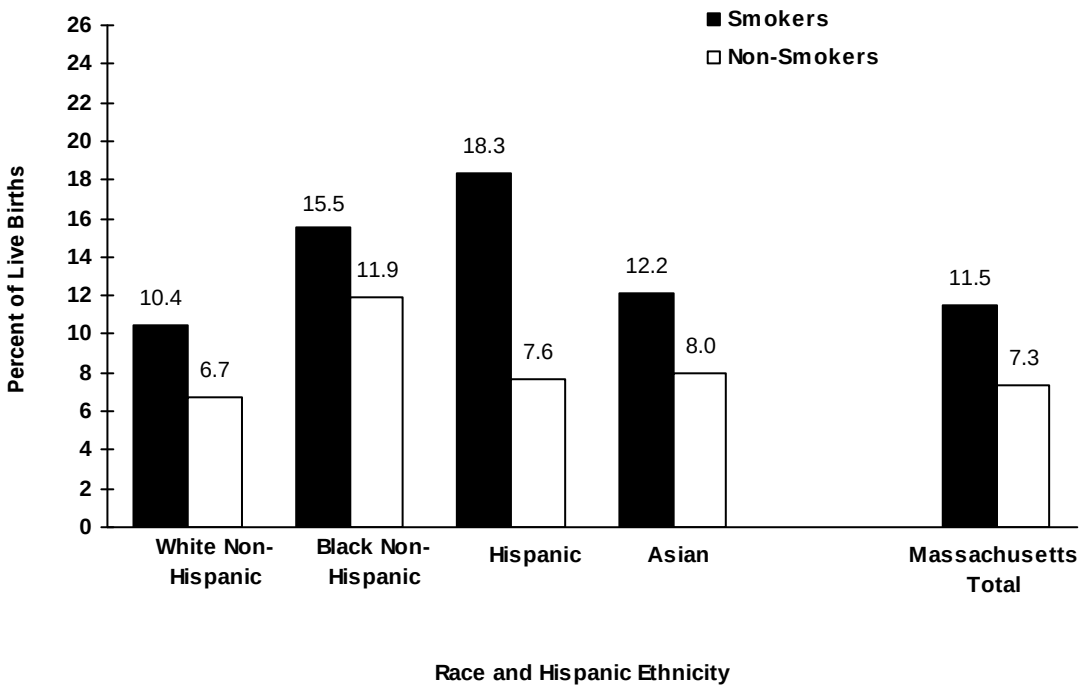
Table 14. Births by Birthweight, Race and Hispanic Ethnicity, Massachusetts: 2003

Birthweight (in grams)	Total		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other		Unknown race/ethnicity
	n	%[1]	n	%[1]	n	%[1]	n	%[1]	n	%[1]	n	%[1]	n
State Total	80,167	100.0	57,604	100.0	5,902	100.0	9,764	100.0	5,224	100.0	1,548	100.0	125
<500	130	0.2	67	0.1	33	0.6	18	0.2	6	0.1	4	--[2]	2
500-999	422	0.5	254	0.4	82	1.4	53	0.5	22	0.4	10	0.6	1
1000-1499	563	0.7	393	0.7	70	1.2	57	0.6	32	0.6	10	0.6	1
1500-1999	1,246	1.6	867	1.5	134	2.3	159	1.6	63	1.2	21	1.4	2
2000-2499	3,754	4.7	2,457	4.3	396	6.7	518	5.3	298	5.7	81	5.2	4
2500-2999	12,032	15.0	7,636	13.3	1,180	20.0	1,769	18.1	1,158	22.2	282	18.2	7
3000-3499	28,952	36.1	20,169	35.0	2,160	36.6	3,885	39.8	2,132	40.8	581	37.5	25
3500-3999	24,178	30.2	18,553	32.2	1,415	24.0	2,547	26.1	1,208	23.1	431	27.8	24
4000-4499	7,398	9.2	6,039	10.5	360	6.1	629	6.4	253	4.8	110	7.1	7
4500-4999	1,217	1.5	1,006	1.7	58	1.0	97	1.0	38	0.7	15	1.0	3
>=5000	123	0.2	102	0.2	8	0.1	11	0.1	1	--[2]	1	--[2]	0
Unknown birthweight	152	0.2	61	0.1	6	0.1	21	0.2	13	0.2	2	--[2]	49
VLBW[3] (0-1,499 g)	1,115	1.4	714	1.2	185	3.1	128	1.3	60	1.2	24	1.6	4
LBW[4] (0-2,499 g)	6,115	7.6	4,038	7.0	715	12.1	805	8.3	421	8.1	126	8.2	10

NOTE: Percentages for detailed birthweight rows ("<500" through "Unknown birthweight") are calculated based on all births including those with unknown birthweight. Percentages for VLBW and LBW rows are calculated based on births with known birthweights only.

1. Percentages are based on column totals. 2. Calculations based on fewer than five events are excluded. 3. Very Low Birthweight (VLBW): less than 1,500 grams (3.3 lbs.).
4. Low Birthweight (LBW): less than 2,500 grams (5.5 lbs.).

Figure 14. Low Birthweight[1] Among Smoking and Nonsmoking[2] Mothers, by Race and Hispanic Ethnicity, Massachusetts: 2003



NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated. Maternal smoking is self-reported, usually following childbirth; these data should be interpreted cautiously.

1. Low birthweight: less than 2,500 grams or 5.5 pounds.
2. Based on information provided on the parent worksheet for birth certificates

Table 15. Low Birthweight (LBW)[1] by Maternal Age, Race and Hispanic Ethnicity, Massachusetts: 2003

Mother's Age (in years)	Total LBW Infants		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[4]		Unknown[5]
	n	%[3]	n	%[3]	n	%[3]	n	%[3]	n	%[3]	n	%[3]	n
State Total[2]	6,115	7.6	4,038	7.0	715	12.1	805	8.2	421	8.1	126	8.1	10
<18	169	11.1	53	8.9	25	12.4	75	12.1	11	15.9	5	11.1	0
18-19	266	8.4	138	8.5	32	9.0	67	7.0	14	12.4	15	14.9	0
20-24	875	7.4	374	5.6	160	12.6	246	8.2	61	10.2	32	8.6	2
25-29	1,391	7.6	870	7.0	174	11.3	192	7.7	126	8.4	28	6.7	1
30-34	1,899	7.1	1,415	6.6	182	12.4	133	7.7	131	6.9	32	8.4	6
35-39	1,174	7.9	918	7.5	105	12.7	73	9.5	68	7.7	9	4.9	1
40+	**340**	**10.0**	**269**	**9.7**	**37**	**16.2**	**19**	**10.7**	**10**	**5.6**	**5**	**10.0**	**0**

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Low Birthweight (LBW): less than 2,500 grams or 5.5 pounds at birth. 2. State totals include women of unknown age. 3. Percentages are based upon the number of low birthweight infants divided by the total births in each age and race/ethnicity category. 4. Other races include American Indian and others not specified. 5. Race and/or mother's age unknown.

Table 16. Low Birthweight by Plurality, Massachusetts: 1993-2003

Age Group	Year	Singleton				Multiples												Total Births			
						Twin				Triplets or more				Total Multiples							
		VLBW[1]		LBW[2]		VLBW[1]		LBW[2]		VLBW[1]		LBW[2]		VLBW[1]		LBW[2]		VLBW[1]		LBW[2]	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
All Ages	**1993**	673	0.8	3,919	4.8	216	9.2	1,105	47.1	73	36.0	178	87.7	289	11.3	1,283	50.4	962	1.1	5,202	6.2
	1994	687	0.8	4,015	5.0	223	9.5	1,122	47.9	66	30.8	198	92.5	289	11.3	1,320	51.6	976	1.2	5,335	6.4
	1995	674	0.9	3,867	4.9	227	9.4	1,128	46.6	63	31.8	179	90.4	290	11.1	1,307	49.9	964	1.2	5,174	6.4
	1996	657	0.9	3,674	4.8	227	8.8	1,264	49.1	45	24.5	167	90.8	272	9.9	1,431	51.9	929	1.2	5,105	6.4
	1997	731	0.9	3,938	5.1	292	10.3	1,439	50.5	75	28.6	240	91.6	367	11.8	1,679	54.0	1,098	1.4	5,617	7.0
	1998	690	0.9	3,819	4.9	298	9.6	1,570	50.7	82	28.5	266	92.4	380	11.2	1,836	54.2	1,070	1.3	5,655	7.0
	1999	731	0.9	3,869	5.0	324	10.3	1,617	51.6	65	26.5	222	90.6	389	11.5	1,839	54.5	1,120	1.4	5,708	7.1
	2000	722	0.9	3,886	5.1	284	8.9	1,603	50.0	84	35.0	222	92.5	368	10.7	1,825	53.0	1,090	1.4	5,711	7.1
	2001	730	0.9	3,931	5.1	310	9.2	1,654	49.2	74	32.9	210	93.3	384	10.7	1,864	52.0	1,114	1.4	5,795	7.2
	2002	699	0.9	3,972	5.2	342	9.2	1,855	50.2	68	28.0	233	95.9	410	10.4	2,088	53.0	1,109	1.4	6,060	7.5
	2003	713	0.9	4,006	5.3	331	9.3	1,877	52.9	71	28.5	232	93.2	402	10.6	2,109	55.6	1,115	1.4	6,115	7.6
Ages < 35	**1993**	561	0.8	3,307	4.7	168	9.2	881	48.2	56	35.9	136	87.2	224	11.3	1,017	51.2	785	1.1	4,324	6.0
	1994	567	0.8	3,397	5.0	181	9.9	891	48.5	47	28.7	150	91.5	228	11.4	1,041	52.0	795	1.1	4,438	6.3
	1995	543	0.8	3,187	4.9	196	11.0	852	47.9	52	36.9	135	95.7	248	12.9	987	51.4	791	1.2	4,174	6.2
	1996	501	0.8	2,937	4.7	194	10.2	944	49.9	32	27.1	111	94.1	226	11.2	1,055	52.5	727	1.1	3,992	6.1
	1997	566	0.9	3,179	5.1	214	11.0	1,030	53.0	46	27.1	153	90.0	260	12.3	1,183	55.9	826	1.3	4,362	6.8
	1998	540	0.9	3,086	4.9	248	11.4	1,148	52.5	60	35.3	153	90.0	308	13.1	1,301	55.2	848	1.3	4,387	6.8
	1999	569	0.9	3,082	5.0	231	10.8	1,124	52.6	49	32.9	138	92.6	280	12.3	1,262	55.2	849	1.3	4,344	6.8
	2000	555	0.9	3,096	5.1	204	9.4	1,097	50.7	49	38.0	125	96.9	253	11.0	1,222	53.3	808	1.3	4,318	6.9
	2001	576	1.0	3,147	5.2	235	10.7	1,156	52.4	41	31.3	120	91.6	276	11.8	1,276	54.6	852	1.4	4,423	7.0
	2002	537	0.9	3,129	5.2	237	10.0	1,229	51.9	42	33.1	125	98.4	279	11.2	1,354	54.2	816	1.3	4,483	7.2
	2003	539	0.9	3,161	5.3	256	10.7	1,325	55.5	38	32.2	114	96.6	294	11.7	1,439	57.5	833	1.3	4,600	7.5
Ages 35+	**1993**	112	0.9	612	5.1	48	9.3	224	43.4	17	36.2	42	89.4	65	11.5	266	47.2	177	1.4	878	7.0
	1994	120	1.0	618	4.9	42	8.3	231	45.6	19	38.0	48	96.0	61	11.0	279	50.1	181	1.4	897	6.9
	1995	130	1.0	679	5.1	31	4.8	276	43.0	11	19.3	44	77.2	42	6.0	320	45.8	172	1.2	999	7.2
	1996	156	1.1	737	5.4	33	4.9	320	47.1	13	19.7	56	84.8	46	6.2	376	50.5	202	1.4	1,113	7.7
	1997	165	1.1	759	5.2	78	8.6	409	45.3	29	31.5	87	94.6	107	10.8	496	49.9	272	1.7	1,255	8.1
	1998	150	1.0	733	4.8	50	5.5	422	46.2	22	18.6	113	95.8	72	7.0	535	51.8	222	1.4	1,268	7.8
	1999	162	1.0	787	5.0	93	9.3	493	49.5	16	16.7	84	87.5	109	10.0	577	52.8	271	1.6	1,364	8.2
	2000	167	1.0	790	4.9	80	7.7	506	48.6	35	31.5	97	87.4	115	10.0	603	52.3	282	1.6	1,393	8.1
	2001	154	0.9	784	4.7	75	6.5	498	43.2	33	35.1	90	95.7	108	8.7	588	47.2	262	1.5	1,372	7.7
	2002	161	1.0	842	5.0	105	7.9	626	47.1	26	22.4	108	93.1	131	9.1	734	50.8	292	1.6	1,576	8.6
	2003	174	1.0	844	5.0	75	6.5	552	47.5	33	25.2	118	90.1	108	8.4	670	51.9	282	1.5	1,514	8.3

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Very Low Birthweight (VLBW): less than 1,500 grams (3.3 lbs.). 2. Low Birthweight (LBW): less than 2,500 grams (5.5 lbs.). 3. Calculations based on fewer than five events are excluded.

Table 17. Births by Gestational Age[1], Race and Hispanic Ethnicity, Massachusetts: 2003

Gestational Age[4]	Total		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[3]		Unknown
(weeks completed)	n	%[2]	n	%[2]	n	%[2]	n	%[2]	n	%[2]	n	%[2]	n
State Total	80,167	100.0	57,604	100.0	5,902	100.0	9,764	100.0	5,224	100.0	1,548	100.0	125
<20	30	0.0	18	0.0	11	0.2	0	0.0	0	0.0	1	--[8]	0
20-23	152	0.2	81	0.1	31	0.5	25	0.3	8	0.2	6	0.4	1
24-27	332	0.4	207	0.4	59	1.0	45	0.5	15	0.3	4	--[8]	2
28-31	715	0.9	491	0.9	86	1.5	82	0.8	41	0.8	14	0.9	1
32-35	3,267	4.1	2,364	4.1	314	5.3	369	3.8	165	3.2	51	3.3	4
36	2,467	3.1	1,772	3.1	204	3.5	293	3.0	142	2.7	54	3.5	2
37-39	37,518	46.8	26,775	46.5	2,786	47.2	4,562	46.7	2,687	51.4	681	44.0	27
40	24,310	30.3	17,528	30.4	1,633	27.7	3,082	31.6	1,545	29.6	496	32.0	26
41	9,822	12.3	7,338	12.7	663	11.2	1,059	10.8	545	10.4	207	13.4	10
42	943	1.2	656	1.1	75	1.3	141	1.4	54	1.0	16	1.0	1
43	23	0.0	14	0.0	4	--[8]	2	--[8]	1	--[8]	2	--[8]	0
44+	4	--[8]	3	--[8]	1	--[8]	0	0.0	0	0.0	0	0.0	0
Unknown[5]	584	0.7	357	0.6	35	0.6	104	1.1	21	0.4	16	1.0	51
Very early gestation, <28 weeks[6]	514	0.6	306	0.5	101	1.7	70	0.7	23	0.4	11	0.7	3
Preterm, <37 weeks[7]	6,963	8.7	4,933	8.6	705	12.0	814	8.4	371	7.1	130	8.5	10

NOTE: Percentages for detailed gestational age category rows ("<20" through "Unknown") are calculated based on all births including those with unknown gestational age. Percentages for "Very early gestation" and "Preterm" rows are calculated based on births with known gestational age only.

1. A clinical estimate of the number of weeks of pregnancy completed; as estimated by the attendant at birth or the postnatal physician. 2. Percentages are based on column total. 3. Other races include American Indian and others not specified. 4. Normal gestational age is defined as 37-42 weeks. 5. Estimate of gestational age not provided. 6. Also known as **extremely** premature delivery, or **extremely** preterm delivery. 7. Also known as early gestational age, premature delivery, or preterm delivery. 8. Calculations based on fewer than five events are excluded.

CHAPTER 5

ADEQUACY OF PRENATAL CARE

Changes in Adequacy of Prenatal Care, 1996-2003

In 2003, in Massachusetts, adequacy of prenatal care as measured by the summary Adequacy of Prenatal Care and Utilization Index (APNCU)[16] fell slightly by less than 1% compared with 2002, 84.7% in 2002 to 84.5% in 2003 (Figure 15). Between 2002 and 2003, adequacy rates increased 2% for black non-Hispanic mothers, and decreased slightly for white non-Hispanic and Hispanic mothers (0.3% and 0.6%, respectively). In 2003, white non-Hispanic women had the highest percentage of adequate prenatal care (86.8%), followed by Asians (81.9%), Hispanics (78.5%), and black non-Hispanics (76.1%).

Components of the Adequacy of Prenatal Care Utilization Index

In Table 18, the two component indices, *initiation* and *received services* (visits), as well as the summary APNCU Index, are described. In 2003, the total percentage of mothers receiving adequate prenatal care ("adequate total") was 84.5%, including 44.5% of mothers who received "adequate basic" prenatal care (they began care in months 1-4 of pregnancy and received 80-109% of the expected number of prenatal visits), and 40.0% of mothers who received "adequate intensive" care (they began care in months 1-4 of pregnancy and received at least 110% of expected number of visits). Approximately 8% of mothers received "intermediate" care (they began care in months 5 or 6 of pregnancy and received 50-70% of expected number of visits). Approximately 1 out of 12 mothers (7.8%) received inadequate prenatal care in Massachusetts in 2003. This includes 235 mothers who received no prenatal care.

In 2003, more than 9 out of 10 Massachusetts mothers (92.8%) had adequate initiation of PNC (Table 18). Half (50.4%) began care in the third or fourth month of pregnancy ("adequate basic" initiation) while 42.5% began care in the first or second month of pregnancy ("adequate intensive" initiation). The sum of these two groups (50.4% + 42.5%) equals the total adequacy score ("adequate total") of 92.8% on the adequacy of initiation index.

Almost half (45.9%) of mothers had 80-109% of the expected number of prenatal care visits ("adequate basic" visits) (Table 18). In addition, 44.7% of mothers had at least 110% of the expected number of prenatal care visits ("adequate intensive" visits). A total of 90.5% (44.7% + 45.9%) of mothers received an adequate number of prenatal care visits.

Adequacy of Prenatal Care Utilization by Selected Maternal and Infant Characteristics

Adequacy of prenatal care increased with both age and educational level of the mother. Almost 9 out of 10 women ages 30 and above received adequate prenatal care; whereas, almost 1 in 5 women under age 18 had inadequate prenatal care (21.8%) (Table 19). Only 68.3% of women ages 18 and younger received adequate prenatal care, and 10.0% received intermediate prenatal care. Women with more education were more likely to receive adequate prenatal care: 90.4% of mothers with more than a college degree had adequate prenatal care, while only 70.7% of mothers with less than a high school education had adequate prenatal care. White non-Hispanic and Asian mothers had the highest adequacy levels, 86.8% and 81.9% respectively. Black non-Hispanic mothers had the lowest adequacy levels (76.1%), and Hispanic mothers had the second lowest (78.5%). Mothers who smoked during their pregnancies were over twice as likely to have inadequate prenatal care when compared with non-smokers, 15.8% vs. 7.1%. Mothers giving birth for the fourth or later time were almost twice as likely to have inadequate prenatal care compared with those giving birth for the first

[16] Milton Kotelchuck, see Appendix for details.

time (13.8% vs. 7.9%). Women who had multiple births were much more likely to receive adequate intensive services compared with mothers delivering a singleton: 82.2% vs. 37.9%. This in all likelihood reflects the higher risk and potential complications for delivery of multiple births. Similarly, women who delivered preterm infants (less than 37 weeks of gestation) were much more likely to have adequate intensive prenatal care than women who delivered at full term (37-42 weeks): 78.4% vs. 36.4%.

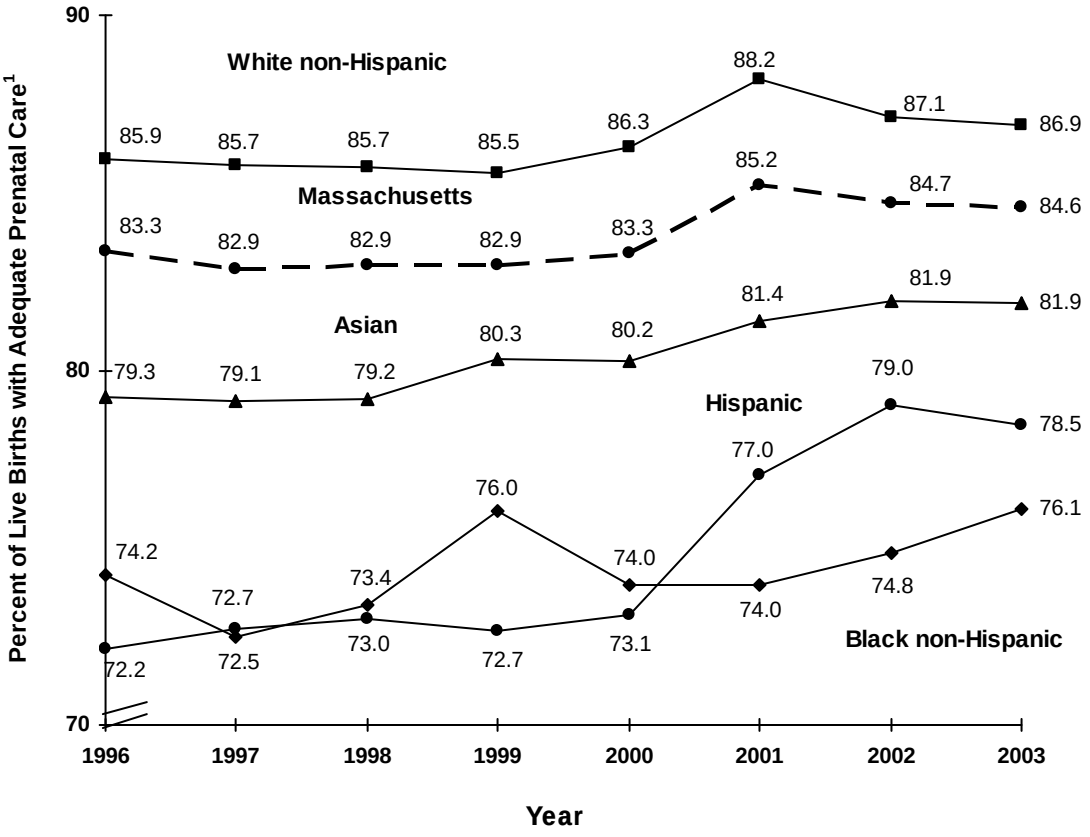
Adequacy of *Initiation* by Selected Maternal and Infant Characteristics

About 1 in 5 teenage mothers did not start prenatal care until their fifth month of pregnancy or had no prenatal care at all (Table 20). (This is the sum of intermediate and inadequate initiation, which equals 20.5% for all women less than 18 years old and 16% for women ages 18-19). Over 95% of mothers age 30 and above began prenatal care in their first four months of pregnancy (as shown by their adequate total scores in Table 20). White non-Hispanic mothers were more likely to have adequate prenatal care initiation (94.9%) than black non-Hispanic mothers (84.5%), Hispanic women (88.5%), and Asian women (90.1%). Mothers who smoked were over twice as likely to have inadequate prenatal care initiation compared with non-smoking mothers (5.9% vs. 2.3%).

Adequacy of *Received Services* (Visits) by Selected Maternal and Infant Characteristics

Older and more educated mothers had higher proportions of adequate PNC visits than did younger or less educated mothers (Table 21). The proportion of adequate prenatal visits by mothers' place of birth was lowest for mothers born in Puerto Rico and other U.S. Territories (87.1%). More than 4 out of 5 women (85.4%) delivering multiple births had an adequate intensive number of visits (at least 110% of the expected number of prenatal care visits adjusted for the length of pregnancy) compared with 42.6% of women who gave birth to singletons. Women who delivered LBW (<2,500 grams) infants were more likely to have adequate intensive care visits than women who delivered normal weight infants. Among those with inadequate visits, mothers who delivered LBW and VLBW infants had the largest percentage of inadequate visits.

Figure 15. Trends in Adequacy of Prenatal Care[1] by Race and Hispanic Ethnicity, Massachusetts: 1996-2003



PLEASE NOTE THAT THE VERTICAL SCALE OF GRAPH REPRESENTS A SMALL INTERVAL (from 70% to 90%) FOR PURPOSES OF VISUAL REPRESENTATION.

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index.

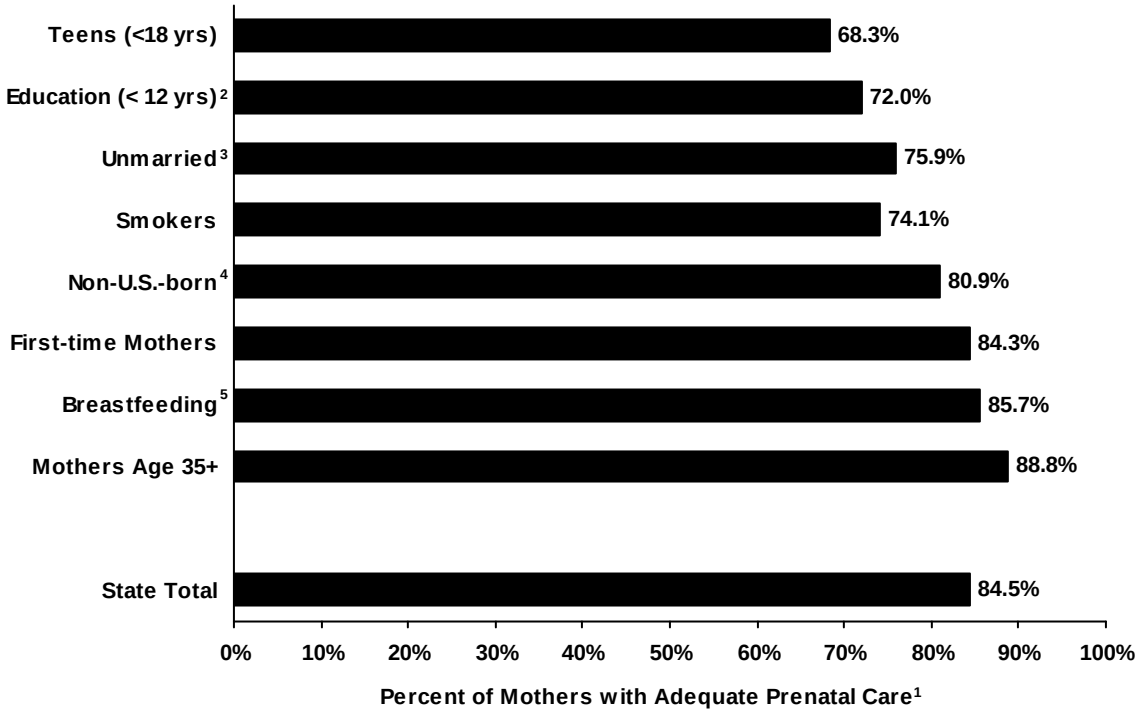
Table 18. Adequacy of Prenatal Care Utilization[1]: Summary and Component Indices, Massachusetts: 2003

	Adequate Total[2]		Adequate Intensive[3]		Adequate Basic[3]		Intermediate[3]		Inadequate[3]		Unknown[3]
	n	%	n	%	n	%	n	%	n	%	n
Summary Index[4]											
Adequacy of Prenatal Care Utilization	67,173	84.5	31,787	40.0	35,386	44.5	6,119	7.7	6,203	7.8	672
Component Indices[4]											
Adequacy of Initiation	73,809	92.8	33,748	42.5	40,061	50.4	3,611	4.5	2,075	2.6	672
Adequacy of Received Services (Visits)	71,979	90.5	35,509	44.7	36,470	45.9	6,648	8.4	868	1.1	672

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic categories. 3. For definitions of these categories, please see the Technical Notes in the Appendix. 4. For an explanation of the APNCU Index (summary index) and its component indices, please see Technical Notes in the Appendix.

Figure 16. Adequacy of Prenatal Care[1] for Selected Population Characteristics, Massachusetts: 2003



NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated. Characteristics of interest are not mutually exclusive, except as noted.

1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. 2. Women 20 years of age and older. 3. Marital status at time of birth. 4. Non-U.S.-born includes women born outside of the 50 U.S. states, District of Columbia, and U.S. territories (Puerto Rico, U.S. Virgin Islands, Guam). 5. Mother was or was intending to breastfeed at the time the birth certificate was completed.

Table 19. Adequacy of Prenatal Care[1] by Selected Characteristics, Massachusetts: 2003

	Adequate Total[2]		Adequate Intensive		Adequate Basic		Intermediate		Inadequate		Unknown
	n	%	n	%	n	%	n	%	n	%	n
State Total	**67,173**	**84.5%**	**31,787**	**40.0%**	**35,386**	**44.5%**	**6,119**	**7.7%**	**6,203**	**7.8%**	**672**
Age	**Maternal Demographics**										
<18	1,029	68.3%	495	32.8%	534	35.4%	150	10.0%	328	21.8%	22
18-19	2,306	73.8%	1,076	34.4%	1,230	39.3%	285	9.1%	535	17.1%	40
20-24	9,014	76.7%	4,208	35.8%	4,806	40.9%	1,138	9.7%	1,601	13.6%	141
25-29	15,348	84.0%	7,192	39.4%	8,156	44.6%	1,496	8.2%	1,427	7.8%	165
30-34	23,332	87.5%	10,845	40.7%	12,487	46.8%	1,949	7.3%	1,375	5.2%	173
35-39	13,153	88.9%	6,378	43.1%	6,775	45.8%	897	6.1%	739	5.0%	100
40+	2,988	88.2%	1,590	46.9%	1,398	41.3%	203	6.0%	198	5.8%	30
Educational Attainment											
< than High School	5,517	70.7%	2,775	35.5%	2,742	35.1%	810	10.4%	1,479	18.9%	109
High School	15,824	80.9%	7,682	39.3%	8,142	41.6%	1,718	8.8%	2,017	10.3%	203
Some college	15,155	85.1%	7,471	41.9%	7,684	43.1%	1,300	7.3%	1,358	7.6%	131
College	18,990	88.8%	8,604	40.2%	10,386	48.6%	1,483	6.9%	904	4.2%	107
More than college	11,591	90.4%	5,205	40.6%	6,386	49.8%	796	6.2%	434	3.4%	61
Race/Hispanic Ethnicity											
Hispanic	7,581	78.5%	3,680	38.1%	3,901	40.4%	883	9.1%	1,197	12.4%	103
White non-Hispanic	49,704	86.8%	23,470	41.0%	26,234	45.8%	4,286	7.5%	3,263	5.7%	351
Black non-Hispanic	4,405	76.1%	2,165	37.4%	2,240	38.7%	421	7.3%	964	16.6%	112
Asian	4,253	81.9%	1,932	37.2%	2,321	44.7%	385	7.4%	552	10.6%	34
Other	1,178	76.7%	515	33.6%	663	43.2%	136	8.9%	221	14.4%	13
Birthplace											
U.S. States/D.C.	50,058	85.9%	23,807	40.8%	26,251	45.0%	4,501	7.7%	3,734	6.4%	451
Puerto Rico/U.S. Terr.	1,546	79.0%	749	38.3%	797	40.7%	193	9.9%	218	11.1%	26
Non-U.S.-Born	15,516	80.9%	7,211	37.6%	8,305	43.3%	1,420	7.4%	2,241	11.7%	180
Parity[3]	**Pregnancy-Related Factors**										
1	29,580	84.3%	13,834	39.4%	15,746	44.9%	2,707	7.7%	2,785	7.9%	214
2-3	33,354	85.6%	15,832	40.6%	17,522	45.0%	2,947	7.6%	2,670	6.9%	277
4+	4,170	77.6%	2,103	39.1%	2,067	38.5%	461	8.6%	742	13.8%	52
Smoking[4]											
Yes	4,482	74.1%	2,317	38.3%	2,165	35.8%	613	10.1%	954	15.8%	74
No	62,608	85.4%	29,431	40.1%	33,177	45.2%	5,490	7.5%	5,236	7.1%	532
Plurality	**Birth Outcomes**										
Singleton	63,633	84.0%	28,701	37.9%	34,932	46.1%	6,052	8.0%	6,054	8.0%	628
Multiple birth	3,540	94.2%	3,086	82.2%	454	12.1%	67	1.8%	149	4.0%	44
Birthweight											
<500 g	110	88.0%	102	81.6%	8	6.4%	2	--[4]	13	10.4%	5
500-1,499 g	874	91.4%	782	81.8%	92	9.6%	15	1.6%	67	7.0%	29
1,499-2,499 g	4,366	88.5%	3,526	71.5%	840	17.0%	169	3.4%	397	8.0%	68
2,500-3,999 g	54,443	84.0%	24,559	37.9%	29,884	46.1%	5,143	7.9%	5,195	8.0%	381
4,000+ g	7,368	84.8%	2,812	32.4%	4,556	52.4%	789	9.1%	530	6.1%	51
Gestational Age											
<28 weeks	446	90.5%	396	80.3%	50	10.1%	4	--[4]	43	8.7%	21
<37 weeks	6,180	90.1%	5,381	78.4%	799	11.6%	166	2.4%	516	7.5%	101
37-42 weeks	60,677	84.0%	26,286	36.4%	34,391	47.6%	5,922	8.2%	5,628	7.8%	366

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. See Glossary and Technical Notes in Appendix for definitions of Index and its categories. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic. 3. Parity is the number of live births including this birth. 4. Smoking during pregnancy is self-reported by the mother and should be interpreted with caution. 4. Calculations based on fewer than five events are excluded.

Table 20. Adequacy of Prenatal Care Initiation[1] by Selected Characteristics, Massachusetts: 2003

	Adequate Total[2]		Adequate Intensive		Adequate Basic		Intermediate		Inadequate		Unknown
	n	%	n	%	n	%	n	%	n	%	n
State Total	**73,809**	**92.8%**	**33,748**	**42.5%**	**40,061**	**50.4%**	**3,611**	**4.5%**	**2,075**	**2.6%**	**672**
Age					**Maternal Demographics**						
<18	1,197	79.4%	422	28.0%	775	51.4%	192	12.7%	118	7.8%	22
18-19	2,630	84.1%	992	31.7%	1,638	52.4%	343	11.0%	153	4.9%	40
20-24	10,272	87.4%	4,368	37.2%	5,904	50.2%	952	8.1%	529	4.5%	141
25-29	16,979	92.9%	7,860	43.0%	9,119	49.9%	805	4.4%	487	2.7%	165
30-34	25,412	95.3%	12,017	45.1%	13,395	50.3%	781	2.9%	463	1.7%	173
35-39	14,112	95.4%	6,630	44.8%	7,482	50.6%	428	2.9%	249	1.7%	100
40+	3,203	94.5%	1,456	43.0%	1,747	51.5%	110	3.2%	76	2.2%	30
Educational Attainment											
< than High School	6,431	82.4%	2,342	30.0%	4,089	52.4%	889	11.4%	486	6.2%	109
High School	17,697	90.5%	7,513	38.4%	10,184	52.1%	1,190	6.1%	672	3.4%	203
Some college	16,564	93.0%	7,555	42.4%	9,009	50.6%	805	4.5%	444	2.5%	131
College	20,575	96.2%	9,693	45.3%	10,882	50.9%	480	2.2%	322	1.5%	107
More than college	12,433	97.0%	6,598	51.5%	5,835	45.5%	240	1.9%	148	1.2%	61
Race/Hispanic Ethnicity											
Hispanic	8,548	88.5%	3,860	40.0%	4,688	48.5%	762	7.9%	351	3.6%	103
White non-Hispanic	54,311	94.9%	25,118	43.9%	29,193	51.0%	1,901	3.3%	1,041	1.8%	351
Black non-Hispanic	4,892	84.5%	2,282	39.4%	2,610	45.1%	477	8.2%	421	7.3%	112
Asian	4,676	90.1%	1,874	36.1%	2,802	54.0%	346	6.7%	168	3.2%	34
Other	1,322	86.1%	593	38.6%	729	47.5%	120	7.8%	93	6.1%	13
Birthplace											
U.S. States/D.C.	54,907	94.2%	25,308	43.4%	29,599	50.8%	2,233	3.8%	1,153	2.0%	451
Puerto Rico/U.S. Terr.	1,763	90.1%	781	39.9%	982	50.2%	133	6.8%	61	3.1%	26
Non-U.S.-Born	17,080	89.1%	7,620	39.7%	9,460	49.3%	1,237	6.5%	860	4.5%	180
Parity[3]					**Pregnancy-Related Factors**						
1	32,513	92.7%	15,034	42.9%	17,479	49.8%	1,614	4.6%	945	2.7%	214
2-3	36,542	93.8%	16,682	42.8%	19,860	51.0%	1,547	4.0%	882	2.3%	277
4+	4,681	87.1%	1,979	36.8%	2,702	50.3%	448	8.3%	244	4.5%	52
Smoking[4]											
Yes	5,174	85.5%	1,996	33.0%	3,178	52.5%	519	8.6%	356	5.9%	74
No	68,535	93.5%	31,710	43.2%	36,825	50.2%	3,084	4.2%	1,715	2.3%	532
Plurality					**Birth Outcomes**						
Singleton	70,189	92.7%	31,905	42.1%	38,284	50.5%	3,506	4.6%	2,044	2.7%	628
Multiple birth	3,620	96.4%	1,843	49.1%	1,777	47.3%	105	2.8%	31	0.8%	44
Birthweight											
<500 g	112	89.6%	49	39.2%	63	50.4%	7	5.6%	6	4.8%	5
500-1,499 g	901	94.2%	483	50.5%	418	43.7%	35	3.7%	20	2.1%	29
1,499-2,499 g	4,572	92.7%	2,145	43.5%	2,427	49.2%	232	4.7%	128	2.6%	68
2,500-3,999 g	59,998	92.6%	27,312	42.2%	32,686	50.5%	3,027	4.7%	1,756	2.7%	381
4,000+ g	8,213	94.5%	3,753	43.2%	4,460	51.3%	309	3.6%	165	1.9%	51
Gestational Age											
<28 weeks	454	92.1%	227	46.0%	227	46.0%	21	4.3%	18	3.7%	21
<37 weeks	6,394	93.2%	3,183	46.4%	3,211	46.8%	323	4.7%	145	2.1%	101
37-42 weeks	67,065	92.9%	30,430	42.1%	36,635	50.7%	3,256	4.5%	1,906	2.6%	366

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Based on the Adequacy of Initiation Index, a component index of the APNCU Index. See Glossary and Technical Notes in Appendix for definitions of Index and its categories. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic. 3. Parity is the number of live births including this birth.
4. Smoking during pregnancy is self-reported by the mother and should be interpreted with caution. 4. Calculations based on fewer than five events are excluded.

Table 21. Adequacy of Prenatal Care Visits[1] by Selected Characteristics, Massachusetts: 2003

	Adequate Total[2]		Adequate Intensive		Adequate Basic		Intermediate		Inadequate		Unknown
	n	%	n	%	n	%	n	%	n	%	n
State Total	**71,979**	**90.5%**	**35,509**	**44.7%**	**36,470**	**45.9%**	**6,648**	**8.4%**	**868**	**1.1%**	**672**
Age	**Maternal Demographics**										
<18	1,289	85.5%	697	46.3%	592	39.3%	179	11.9%	39	2.6%	22
18-19	2,716	86.9%	1,399	44.8%	1,317	42.1%	339	10.8%	71	2.3%	40
20-24	10,241	87.1%	5,130	43.6%	5,111	43.5%	1,285	10.9%	227	1.9%	141
25-29	16,450	90.0%	8,020	43.9%	8,430	46.1%	1,617	8.9%	204	1.1%	165
30-34	24,405	91.6%	11,695	43.9%	12,710	47.7%	2,059	7.7%	192	0.7%	173
35-39	13,735	92.9%	6,854	46.3%	6,881	46.5%	950	6.4%	104	0.7%	100
40+	3,140	92.7%	1,711	50.5%	1,429	42.2%	218	6.4%	31	0.9%	30
Educational Attainment											
< than High School	6,629	84.9%	3,625	46.4%	3,004	38.5%	972	12.5%	205	2.6%	109
High School	17,356	88.7%	8,844	45.2%	8,512	43.5%	1,906	9.7%	297	1.5%	203
Some college	16,230	91.1%	8,301	46.6%	7,929	44.5%	1,401	7.9%	182	1.0%	131
College	19,719	92.2%	9,194	43.0%	10,525	49.2%	1,532	7.2%	126	0.6%	107
More than college	11,942	93.1%	5,490	42.8%	6,452	50.3%	824	6.4%	55	0.4%	61
Race/Hispanic Ethnicity											
Hispanic	8,538	88.4%	4,410	45.6%	4,128	42.7%	987	10.2%	136	1.4%	103
White non-Hispanic	52,221	91.2%	25,435	44.4%	26,786	46.8%	4,530	7.9%	502	0.9%	351
Black non-Hispanic	5,126	88.5%	2,729	47.1%	2,397	41.4%	522	9.0%	142	2.5%	112
Asian	4,684	90.3%	2,262	43.6%	2,422	46.7%	444	8.6%	62	1.2%	34
Other	1,353	88.1%	645	42.0%	708	46.1%	156	10.2%	26	1.7%	13
Birthplace											
U.S. States/D.C.	52,896	90.7%	26,005	44.6%	26,891	46.1%	4,814	8.3%	583	1.0%	451
Puerto Rico/U.S. Terr.	1,704	87.1%	865	44.2%	839	42.9%	220	11.2%	33	1.7%	26
Non-U.S.-Born	17,319	90.3%	8,613	44.9%	8,706	45.4%	1,608	8.4%	250	1.3%	180
Parity[3]	**Pregnancy-Related Factors**										
1	31,775	90.6%	15,546	44.3%	16,229	46.3%	2,921	8.3%	376	1.1%	214
2-3	35,416	90.9%	17,446	44.8%	17,970	46.1%	3,173	8.1%	382	1.0%	277
4+	4,717	87.8%	2,498	46.5%	2,219	41.3%	550	10.2%	106	2.0%	52
Smoking[4]											
Yes	5,163	85.4%	2,833	46.8%	2,330	38.5%	712	11.8%	174	2.9%	74
No	66,725	91.0%	32,633	44.5%	34,092	46.5%	5,917	8.1%	692	0.9%	532
Plurality	**Birth Outcomes**										
Singleton	68,310	90.2%	32,302	42.6%	36,008	47.5%	6,577	8.7%	852	1.1%	628
Multiple birth	3,669	97.7%	3,207	85.4%	462	12.3%	71	1.9%	16	0.4%	44
Birthweight											
<500 g	117	93.6%	107	85.6%	10	8.0%	2	--[4]	6	4.8%	5
500-1,499 g	911	95.3%	814	85.1%	97	10.1%	17	1.8%	28	2.9%	29
1,499-2,499 g	4,651	94.3%	3,760	76.2%	891	18.1%	198	4.0%	83	1.7%	68
2,500-3,999 g	58,493	90.3%	27,675	42.7%	30,818	47.6%	5,606	8.7%	682	1.1%	381
4,000+ g	7,794	89.7%	3,146	36.2%	4,648	53.5%	824	9.5%	69	0.8%	51
Gestational Age											
<28 weeks	468	94.9%	413	83.8%	55	11.2%	4	--[4]	21	4.3%	21
<37 weeks	6,545	95.4%	5,689	82.9%	856	12.5%	199	2.9%	118	1.7%	101
37-42 weeks	65,082	90.1%	29,676	41.1%	35,406	49.0%	6,410	8.9%	735	1.0%	366

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Based on the Adequacy of Received Services (Visits) Index, a component index of the APNCU Index. See Glossary and Technical Notes in Appendix for definitions of Index and its categories. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic. 3. Parity is the number of live births including this birth. 4. Smoking during pregnancy is self-reported by the mother and should be interpreted with caution. 4. Calculations based on fewer than five events are excluded.

CHAPTER 6

PRENATAL CARE SOURCE OF PAYMENT

Prenatal Care Payment Source

In 2003, among all births to Massachusetts women, 70.0% were to mothers who had their prenatal care (PNC) paid for by private sources (commercial indemnity plans, commercial managed care organizations (HMO, PPO/IPP/IPA, etc.), or other private insurance) (Figure 17). Public entitlement programs, including Commonhealth, Medicaid/MassHealth and Healthy Start (a Massachusetts-funded program), covered the prenatal care expenses for 28.9% of all births to Massachusetts women in 2003 as compared with 28.5% in 2002. Although this year's increase over last is modest (1.4%), the percentage has increased each year from 1996 (24.2%) to 2003, which is an increase of 19%. Finally, 1.1% of all births were considered "self-pay", which often means that mothers had no sources of payment (0.7%) or had their care paid for by other sources (0.4%).

Contrasting of Women Who had Publicly Financed and Privately Insured Prenatal Care

Maternal and birth characteristics varied according to whether prenatal care was financed through public programs or through private insurance. Overall in Massachusetts, about 1 in 4 mothers had her prenatal care financed by Medicaid. However, Medicaid financing varied largely by race and Hispanic ethnicity. About half of Hispanic and black non-Hispanic mothers had their PNC financed by Medicaid; whereas, 23.0% of Asian and 15.3% of white non-Hispanic mother's PNC was Medicaid financed (Table 22).

Among women whose prenatal care was funded by Medicaid/MassHealth, 15.5% were under the age of 20. In contrast, only 2.0% of women whose prenatal care was privately insured were under age 20 (Table 22). Hispanic women had the highest proportion of mothers under the age of 20 with both publicly (20.0%) and privately (8.0%) funded prenatal care.

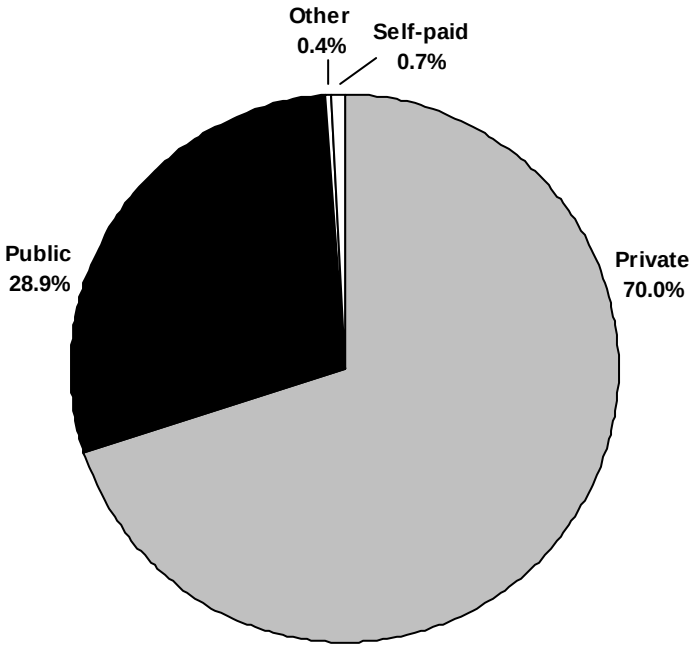
Overall, women whose prenatal care was publicly funded had a higher proportion of low birthweight (8.5%) than women whose prenatal care was privately insured (7.1%). However, this relationship between prenatal care payment source and low birthweight varied by race/ethnicity (Table 22). White non-Hispanic and Hispanic women with publicly financed prenatal care were more likely to have low birthweight infants when compared with those with private insurance. However, among black non-Hispanic and Asian women, there was little difference in infants' low birthweight based on prenatal care insurance source. Black non-Hispanic women with private insurance were somewhat more likely to have low birthweight infants (12.5%) compared with those with publicly financed insurance (11.3%).

Women whose prenatal care was publicly financed were less likely to receive adequate prenatal care. This was true overall and for each race and ethnicity group. For example, 69.0% of black non-Hispanic women whose prenatal care was publicly financed received adequate prenatal care, while 88.6% of black non-Hispanic women with private insurance received adequate prenatal care (Table 22).

Overall, women with publicly funded prenatal care were less likely to deliver by Cesarean section (25.5%), compared with women with private insurance (31.0%). Among mothers whose prenatal care was publicly funded, black non-Hispanics have the highest percentage of Cesarean section (28.5%) and Asians have the lowest rate (19.6%). Among mothers with private funding for prenatal care, black non-Hispanic mothers have the highest Cesarean section rate (34.3%), and Hispanics have the lowest (28.3%).

Women of all race and ethnicity groups whose prenatal care was publicly funded were less likely to report breastfeeding or the intent to breastfeed (69.2%) compared with women who had private insurance (81.8%). The lowest breastfeeding rates were found among Asian women (64.2%) and white non-Hispanic (61.8%) women (Table 22).

Figure 17. Distribution of Prenatal Care Payment Source[1], Massachusetts: 2003



NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Private: Commercial indemnity plan, commercial managed care (HMO, PPO, IPP, IPA, and other), or other private insurance. Public: Government programs including Commonhealth, Healthy Start, Medicaid/MassHealth, and Medicare (may also be HMO or managed care), or free care. Other: Worker's Compensation and other sources.

Table 22. Birth Characteristics by Race/Hispanic Ethnicity and Source of Prenatal Care Payment (Public/Private) -- Massachusetts: 2003

Race/Ethnicity and Payment Source	Births[1]		Teen Births				Birthweight			
			<18 Years		<20 Years		Very Low[2]		Low[3]	
	n	%	n	%	n	%	n	%	N	%
STATE TOTAL[4]	**80,167**	**100.0**	**1,529**	**1.9**	**4,695**	**5.9**	**1,115**	**1.4**	**6,115**	**7.6**
Public	22,685	28.9	1,098	4.8	3,472	15.3	327	1.4	1,925	8.5
Medicaid[5]	17,948	22.9	889	5.0	2,783	15.5	265	1.5	1,532	8.5
Other Public[6]	4,737	6.0	209	4.4	689	14.5	62	1.3	393	8.3
Private[7]	54,913	70.0	380	0.7	1,073	2.0	697	1.3	3,889	7.1
White non-Hispanic	**57,604**	**100.0**	**593**	**1.0**	**2,223**	**3.9**	**714**	**1.2**	**4,038**	**7.0**
Public	10,398	18.5	345	3.3	1,454	14.0	107	1.0	793	7.6
Medicaid[5]	8,590	15.3	309	3.6	1,249	14.5	95	1.1	672	7.8
Other Public[6]	1,808	3.2	36	2.0	205	11.3	12	0.7	121	6.7
Private[7]	45,237	80.5	223	0.5	687	1.5	542	1.2	3,028	6.7
Black non-Hispanic	**5,902**	**100.0**	**201**	**3.4**	**557**	**9.4**	**185**	**3.1**	**715**	**12.1**
Public	3,417	58.9	167	4.9	446	13.1	97	2.8	387	11.3
Medicaid[5]	2,661	45.9	129	4.8	345	13.0	75	2.8	307	11.5
Other Public[6]	756	13.0	38	5.0	101	13.4	22	2.9	80	10.6
Private[7]	2,312	39.9	27	1.2	93	4.0	76	3.3	288	12.5
Hispanic	**9,764**	**100.0**	**619**	**6.3**	**1,581**	**16.2**	**128**	**1.3**	**805**	**8.2**
Public	6,614	68.2	498	7.5	1,312	19.8	87	1.3	565	8.5
Medicaid[5]	4,788	49.4	369	7.7	957	20.0	64	1.3	396	8.3
Other Public[6]	1,826	18.8	129	7.1	355	19.4	23	1.3	169	9.3
Private[7]	2,943	30.3	107	3.6	235	8.0	38	1.3	224	7.6
Asian	**5,224**	**100.0**	**69**	**1.3**	**182**	**3.5**	**60**	**1.1**	**421**	**8.1**
Public	1,392	26.9	52	3.7	140	10.1	23	1.7	111	8.0
Medicaid[5]	1,190	23.0	49	4.1	129	10.8	21	1.8	95	8.0
Other Public[6]	202	3.9	3	--[8]	11	5.4	2	--[8]	16	7.9
Private[7]	3,746	72.3	13	0.3	36	1.0	32	0.9	301	8.0
Other[9]	**1,548**	**100.0**	**45**	**2.9**	**146**	**9.4**	**24**	**1.6**	**126**	**8.1**
Public	851	56.2	35	4.1	117	13.7	13	1.5	68	8.0
Medicaid[5]	711	47.0	32	4.5	101	14.2	10	1.4	61	8.6
Other Public[6]	140	9.3	3	--[8]	16	11.4	3	--[8]	7	5.0
Private[7]	630	41.6	10	1.6	22	3.5	8	1.3	44	7.0

Table 22 (cont'd). Birth Characteristics by Race/Hispanic Ethnicity and Source of Prenatal Care Payment (Public/Private) -- Massachusetts: 2003

Race/Ethnicity and Payment Source	Prenatal Care: Adequate[10] n	Prenatal Care: Adequate[10] %	Prenatal Care: Began 1st Trimester n	Prenatal Care: Began 1st Trimester %	Cesarean Section n	Cesarean Section %	Breastfeeding[11] n	Breastfeeding[11] %
STATE TOTAL[4]	**67,173**	**84.5**	**66,789**	**83.9**	**23,392**	**29.3**	**61,388**	**78.1**
Public	16,801	74.8	16,125	71.6	5,773	25.5	15,656	69.2
Medicaid[5]	13,484	75.7	12,946	72.5	4,567	25.5	12,150	67.8
Other Public[6]	3,317	71.4	3,179	68.0	1,206	25.7	3,506	74.7
Private[7]	48,702	89.0	48,971	89.4	16,987	31.0	44,856	81.8
White non-Hispanic	**49,704**	**86.8**	**49,980**	**87.2**	**17,235**	**30.1**	**43,338**	**77.0**
Public	7,972	77.1	7,659	74.0	2,676	25.8	6,411	61.8
Medicaid[5]	6,604	77.2	6,352	74.2	2,195	25.6	5,111	59.6
Other Public[6]	1,368	76.6	1,307	73.0	481	26.8	1,300	72.5
Private[7]	40,307	89.4	40,872	90.5	14,064	31.2	36,369	80.6
Black non-Hispanic	**4,405**	**76.1**	**4,195**	**71.9**	**1,808**	**30.8**	**4,644**	**79.5**
Public	2,302	69.0	2,194	65.1	972	28.5	2,551	74.8
Medicaid[5]	1,857	71.2	1,766	67.0	756	28.5	2,005	75.4
Other Public[6]	445	61.3	428	58.2	216	28.7	546	72.6
Private[7]	2,037	88.6	1,932	83.9	787	34.3	2,007	87.1
Hispanic	**7,581**	**78.5**	**7,358**	**76.0**	**2,507**	**25.8**	**7,840**	**80.8**
Public	4,939	75.4	4,814	73.3	1,635	24.8	5,118	77.8
Medicaid[5]	3,658	77.0	3,576	75.1	1,202	25.2	3,733	78.1
Other Public[6]	1,281	71.4	1,238	68.6	433	24.0	1,385	76.8
Private[7]	2,544	86.7	2,447	83.3	830	28.3	2,574	87.6
Asian	**4,253**	**81.9**	**4,044**	**77.9**	**1,386**	**26.6**	**4,266**	**82.1**
Public	984	71.3	873	63.1	272	19.6	893	64.2
Medicaid[5]	846	71.6	746	63.0	223	18.7	738	62.0
Other Public[6]	138	69.0	127	63.5	49	24.4	155	77.1
Private[7]	3,228	86.4	3,130	83.7	1,096	29.3	3,322	88.7
Other[9]	**1,178**	**76.7**	**1,158**	**75.2**	**432**	**28.1**	**1,259**	**82.8**
Public	595	70.3	578	68.2	214	25.2	677	79.6
Medicaid[5]	512	72.3	502	70.8	187	26.4	559	78.7
Other Public[6]	83	60.1	76	55.1	27	19.3	118	84.3
Private[7]	549	87.8	549	87.6	198	31.6	552	87.6

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. In the "Births" column, percentages are based on race/ethnicity category totals (in column). For all other characteristics, percentages are based on the total number of births for the race/ethnicity by payment source for the row. 2. Very low birthweight: less than 1,500 grams or 3.3 pounds. 3. Low Birthweight: less than 2,500 grams or 5.5 pounds. 4. Total births do not equal Public + Private because Workers' Compensation, self-paid, and other are in the state total but not shown in the table. 5. Medicaid/MassHealth. 6. Other Public: Commonhealth, Healthy Start, Medicare, other government programs, and free care.
7. Private: commercial indemnity plans or commercial managed care orgs. (HMO, PPO, IPP, or IPA). 8. Calculations based on fewer than five events are excluded. 9. Other: Mothers who designated their race as American Indian or "Other." 10. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. 11. Mother was intending to breastfeed at the time the birth certificate was completed.

CHAPTER 7

CESAREAN SECTION DELIVERIES BY HOSPITAL

Introduction

In 2003, 81,310 births occurred in Massachusetts, which is a decrease of 14% since 1990 (94,406 births) (Table 23).

Please note: the percentages and rates provided in Tables 23, 24, 25, and 26 are based on occurrence births (births that occurred in Massachusetts but whose mothers are both Massachusetts and non-Massachusetts residents) and differ from data presented elsewhere in this report, which are based on only Massachusetts residents.

Cesarean Section Delivery by Facility

Cesarean section was the method of delivery for 29.5%[17] of the live births occurring in Massachusetts ("occurrence births") in 2003 (Table 23), up 5% from the 2002 rate of 28.2%. Since 1997, there has been a 49% increase in the percentage of Cesarean section deliveries in Massachusetts, from 19.8% in 1997 to 29.5% in 2003, after a steady decline in Cesarean sections from 1990 (22.5%) to 1997 (19.8%) (data not shown). Calculations are based on births with known method of delivery. Note: facility-specific highlights in this chapter focus on facilities with at least 40 births in the category of interest. Data for all facilities are provided in Tables 23 and 24.

In 2003, the following facilities had Cesarean section delivery rates at least 15% below or at least 15% above the state rate of 29.5% (Table 23):

Eleven facilities had cesarean section rates below 25.1% (15% below the state rate):

- Tobey Hospital
- Heywood Memorial Hospital
- Berkshire Medical Ctr.
- Mercy Medical Ctr.
- Holyoke Hospital
- Leominster Hospital
- Saint Vincent Hospital
- St. Luke's Hospital
- Mount Auburn Hospital
- Jordan Hospital
- Franklin Medical Ctr.

Eight facilities had cesarean section rates above 33.9% (15% above the state rate):

- Melrose-Wakefield Hospital
- Metrowest Med. Center-Framingham
- Saints Memorial Med. Ctr.
- North Adams Regional Hospital
- Caritas St. Elizabeth's Med. Ctr.
- Beth Israel Deaconess Med. Ctr.
- Holy Family Hospital and Med. Ctr.
- Tufts-New England Med. Ctr Hospital

[17] Percentages of method of delivery in Table 23 are calculated in following manner:

- Percentage of total Cesarean sections = (Total Cesarean Births / All Births) x 100.
- Percentage primary Cesarean sections = (Primary Cesarean Sections / (All Births - Repeat Cesarean Sections -VBACs)) x 100.
- Percentage repeat Cesarean sections = (Repeat Cesarean Sections / (Repeat Cesarean Sections + VBACs)) x 100.
- Percentage of vaginal birth after Cesarean section delivery (VBACs) = (VBAC deliveries / (Repeat Cesarean Sections + VBAC)) x 100. Please note: the sum of the percentages of repeat Cesarean section deliveries + VBACs = 100% of all deliveries of mothers with a prior Cesarean section.

Primary Cesarean Section Deliveries

The primary Cesarean section delivery rate is defined as the proportion of live births delivered by Cesarean section to mothers with no previous history of a Cesarean section. This rate was 21.4% statewide in 2003, up 4% from the 2002 rate of 20.5%.

In 2003, the following facilities had primary Cesarean section delivery rates at least 15% below or at least 15% above the state rate of 21.4% (Table 23):

Sixteen facilities had this rate below 18.2% (15% below the state rate):

Tobey Hospital	Lawrence General Hospital
Heywood Memorial Hospital	Harrington Memorial Hospital
Leominster Hospital	Anna Jaques Hospital
Mercy Medical Ctr.	Cape Cod Hospital
Berkshire Medical Ctr.	Jordan Hospital
St. Luke's Hospital	Franklin Medical Ctr.
Holyoke Hospital	Saint Vincent Hospital
Morton Hospital	Mount Auburn Hospital

Six facilities had this rate above 24.7% (15% above the state rate):

Saints Memorial Med. Ctr.	Caritas St. Elizabeth's Med. Ctr.
Holy Family Hospital and Med. Ctr.	Beth Israel Deaconess Med. Ctr.
North Adams Regional Hospital	Tufts-New England Med. Ctr. Hospital

Repeat Cesarean Section Deliveries

The proportion of live births delivered by Cesarean section to mothers with a prior Cesarean section is known as the repeat Cesarean section delivery rate. This rate was 87.5% in 2003, up 3% from the 2002 rate of 85.3%.

Repeat Cesarean section delivery rates were lowest at Heywood Memorial Hospital (73.9%), Berkshire Medical Center (74.7%), and Franklin Medical Center (77.6%). Facilities with high rates of repeat Cesarean section deliveries include Caritas Good Samaritan Medical Center (97.9%), Falmouth Hospital (100.0%), and Metrowest Medical Center-Framingham Union Campus (100.0%) (Table 23).

Vaginal Birth after Cesarean Section (VBAC) Deliveries

The proportion of live births delivered vaginally to mothers with a prior Cesarean section is known as the vaginal birth after a Cesarean section (VBAC) delivery rate. Since women with a history of Cesarean section delivery must deliver either by repeat Cesarean section or VBAC, these two percentages add to 100. In 2003, the VBAC rate was 12.5%, down 15% from the 2002 rate of 14.7%. In 1996, the VBAC rate peaked at 34.0% (trend data not shown), and it has been declining since then.

In 2003, only eight facilities had over 40 births delivered through VBAC. The VBAC delivery rate among these facilities ranged from 9.4% for South Shore Hospital to 21.2% for Saint Vincent Hospital. The other six facilities with over 40 births delivered through VBAC were Massachusetts General Hospital (12.9%), UMass Memorial Medical Center - West Campus (13.8%), Beverly Hospital (14.0%), Beth Israel Deaconess Medical Center (14.3%), Baystate Medical Center (16.0%), and Brigham and Women's Hospital (19.5%).

Since the sum of the percentage of repeat Cesarean section deliveries and vaginal births after Cesareans (VBACs) equals 100% of all births to mothers with a prior Cesarean section, facilities with the lowest repeat Cesarean section delivery rates had the highest VBAC rates. In 2003, as in 2002, none of the maternity facilities had a VBAC rate over 30%; whereas, in past years there were some facilities with VBAC rates over 40% (one in 2001, two in 2000, four in 1999, and 13 in 1998).

Cesarean Section Deliveries for Singleton Births

Cesarean section was the method of delivery for 29.1% of singleton births to mothers who gave birth to their first child in a Massachusetts licensed maternity facility in 2003 (Table 24), up 4% from the 2002 rate of 28.1% .

In 2003, the following facilities had cesarean section delivery rates for singleton births to mothers who gave birth to their first child at least 15% below and at least 15% above the state rate of 29.1% (Table 24):

Eleven facilities had this rate below 24.7% (15% below the state rate):

- Tobey Hospital
- Holyoke Hospital
- Heywood Memorial Hospital
- Berkshire Medical Ctr.
- Martha's Vineyard Hospital
- Leominster Hospital
- Morton Hospital
- Lawrence General Hospital
- St. Luke's Hospital
- UMass Memorial Med. Ctr. - West Campus
- Jordan Hospital

Thirteen facilities had this rate above 32.3% (15% above the state rate):

- Winchester Hospital
- Sturdy Memorial Hospital
- Saints Mem. Med. Ctr.
- Caritas St. Elizabeth's Ctr. of Boston
- Milford-Whitinsville Regional Hospital
- Metrowest Med. Ctr. -Framingham
- Beth Israel Deaconess Medical Ctr.
- Newton-Wellesley Hospital
- Emerson Hospital
- Caritas Good Samaritan Medical Ctr.
- Caritas Norwood Hospital
- Holy Family Hospital and Medical Ctr.
- North Adams Regional Hospital

In 2003, cesarean section was the method of delivery for 8.8% of singleton births to mothers having the second or later birth who had no prior cesarean section, compared with 8.7% in 2002. The following facilities had this rate at least 15% below and at least 15% above the state rate of 8.1% (Table 24):

Fifteen facilities had this rate below 7.5% (15% below the state rate):

- Heywood Memorial Hospital
- Franklin Medical Ctr
- Mount Auburn Hospital
- Jordan Hospital
- Cape Cod Hospital
- Tobey Hospital

Cooley Dickinson Hospital
Saint Vincent Hospital
Mercy Medical Center
Leominster Hospital
Berkshire Medical Ctr
St. Luke's Hospital
Anna Jaques Hospital
Caritas Norwood Hospital
Lawrence General Hospital

Thirteen facilities had this rate above 10.1% (15% above the state rate):

Massachusetts General Hospital
Holy Family Hospital and Med. Ctr.
Saints Memorial Med. Ctr.-St. John's
Caritas Good Samaritan Med. Center
Holyoke Hospital
North Shore Med. Ctr.- Salem Hospital
Beth Israel Deaconess Medical Center
Charlton Memorial Hospital
Melrose-Wakefield Hospital
Tufts-New England Medical Ctr. Hospital
Boston Medical Ctr.
Brockton Hospital
Mary Lane Hospital

In 2003, Cesarean section was the method of delivery for 87.3% of singleton births to mothers having their second or later birth who had prior Cesarean sections, up 3% from the 2002 rate of 84.8%. Heywood Memorial Hospital (71.0%) and Berkshire Medical Center (73.3%) had the lowest rates. Caritas Good Samaritan Medical Center (97.7%), Falmouth Hospital (100%), and Metrowest Medical Center-Framingham Union Campus (100%) had the highest rates (Table 24).

Table 23. Cesarean Section Deliveries and Vaginal Births after Cesarean Section (VBACs) by Licensed Maternity Facility[1], All Births, Massachusetts: 2003

Facility	Occurrence Births[2]	Total C-Sections		Primary C-Section[2]		Repeat C-Section[2]		VBACs[2]	
		n	%[3,4]	n	%[3,5]	n	%[3,6]	n	%[7]
State Total	**81,310**	**23,860**	**29.5**	**15,150**	**21.4**	**8,710**	**87.5**	**1,240**	**12.5**
Anna Jaques Hspt.	792	206	26.0	119	17.3	87	82.1	19	17.9
Baystate Med. Ctr.	4,283	1,145	27.7	741	20.3	404	84.0	77	16.0
Berkshire Med. Ctr.	788	170	21.6	108	15.3	62	74.7	21	25.3
Beth Israel Deaconess Med. Ctr.	5,035	1,819	36.1	1,191	27.7	628	85.7	105	14.3
Beverly Hspt.	2,312	647	28.0	396	19.6	251	86.0	41	14.0
Boston Med. Ctr.	2,087	555	26.6	361	19.4	194	86.2	31	13.8
Brigham And Women's Hspt.	9,402	2,925	31.2	2,014	24.5	911	80.5	220	19.5
Brockton Hspt.	1,219	364	29.9	254	23.5	110	79.1	29	20.9
Cambridge Hspt.	1,066	274	26.7	179	19.6	95	81.9	21	18.1
Cape Cod Hspt.	1,001	271	27.1	149	17.3	122	85.9	20	14.1
Caritas Good Samaritan Med. Ctr.	1,021	341	33.4	203	23.1	138	97.9	3	--[9]
Caritas Norwood Hspt.	644	210	32.7	138	24.6	72	87.8	10	12.2
Caritas St. Elizabeth's	1,464	520	35.6	341	27.0	179	91.3	17	8.7
Charlton Memorial Hspt.	1,729	504	29.1	329	21.4	175	90.2	19	9.8
Cooley Dickinson Hspt.	911	243	26.7	148	18.6	95	81.9	21	18.1
Emerson Hspt.	1,319	428	32.4	273	23.8	155	90.6	16	9.4
Fairview Hspt.	174	47	27.0	23	15.4	24	96.0	1	--[9]
Falmouth Hspt.	641	173	27.0	106	18.5	67	100.0	0	0.0
Franklin Med. Ctr.	464	116	25.0	71	17.5	45	77.6	13	22.4
Harrington Memorial Hspt.	462	117	25.9	68	17.3	49	84.5	9	15.5
Heywood Memorial Hspt.	597	117	19.6	66	12.5	51	73.9	18	26.1
Holy Family Hspt. And Med. Ctr.	1,386	502	36.2	317	26.6	185	95.4	9	4.6
Holyoke Hspt.	563	129	22.9	82	16.3	47	79.7	12	20.3
Jordan Hspt.	738	184	24.9	117	17.5	67	95.7	3	--[9]
Lawrence General Hspt.	1,742	498	28.6	244	16.6	254	94.4	15	5.6
Leominster Hspt.	1,215	291	24.1	158	14.8	133	91.7	12	8.3
Lowell General Hspt.	1,951	563	28.9	324	19.3	239	88.2	32	11.8
Martha's Vineyard Hspt.	137	41	29.9	21	18.1	20	95.2	1	--[9]
Mary Lane Hspt.	148	48	32.4	28	21.9	20	100.0	0	0.0

Table 23 (cont'd). Cesarean Section Deliveries and Vaginal Births After Cesarean Section (VBACs) by Licensed Maternity Facility[1], All Births, Massachusetts: 2003

Facility	Occurrence Births[2]	Total C-Sections		Primary C-Section[2]		Repeat C-Section[2]		VBACs[2]	
		n	%[3,4]	n	%[3,5]	n	%[3,6]	n	%[7]
Massachusetts General Hspt.	3,587	1,056	29.4	760	23.4	296	87.1	44	12.9
Melrose-Wakefield Hspt.	1,721	585	34.0	321	22.3	264	94.0	17	6.0
Mercy Med. Ctr.	1,406	306	21.8	193	15.2	113	83.7	22	16.3
Metrowest Med. Ctr.-Framingham Union Campus	2,211	751	34.0	466	24.2	285	100.0	0	0.0
Milford-Whitinsville Regional Hspt.	904	278	30.8	180	22.7	98	89.1	12	10.9
Morton Hspt.	523	151	29.4	70	16.5	81	92.0	7	8.0
Mount Auburn Hspt.	1,730	425	24.6	276	17.9	149	80.5	36	19.5
Nantucket Cottage Hspt.	96	25	26.0	13	15.5	12	100.0	0	0.0
Newton-Wellesley Hspt.	3,072	1,025	33.4	641	24.2	384	91.4	36	8.6
North Adams Regional Hspt.	303	106	35.0	70	26.7	36	87.8	5	12.2
North Shore Med. Ctr.. - Salem Hspt.	1,849	555	30.0	368	22.4	187	90.3	20	9.7
Saint Vincent Hspt.	1,842	443	24.4	287	17.8	156	78.8	42	21.2
Saints Memorial Medical Ctr.	724	246	34.0	161	25.3	85	96.6	3	3.4
South Shore Hspt.	4,162	1,218	29.3	724	20.0	494	90.6	51	9.4
St. Luke's Hspt.	1,527	371	24.5	206	15.5	165	88.2	22	11.8
Sturdy Memorial Hspt.	1,056	337	31.9	197	21.7	140	94.6	8	5.4
Tobey Hspt.	525	73	16.2	45	10.8	28	80.0	7	20.0
Tufts-New England Med. Ctr. Hspt.	1,419	521	36.7	342	28.1	179	89.1	22	10.9
UMass Memorial Med. Ctr. - West Campus	4,473	1,226	27.4	813	20.4	413	86.2	66	13.8
Winchester Hspt.	2,261	713	31.5	447	22.6	266	94.7	15	5.3

NOTES: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. 2. See Glossary for definitions of occurrence births, primary and repeat Cesarean sections, and VBACs. The percentages provided in this table are based on occurrence births, and may differ from data, which are based on resident births, presented elsewhere in this book. 3. The percentage of Cesarean births reported is not adjusted for risk factors such as mother's age, birthweight, or complications of labor and delivery, which would influence the number of procedures in a particular facility. Caution should be used when comparing unadjusted percentages. 4. Percentage of total Cesarean sections= (total Cesarean births/all births) x 100. 5. Percentage primary Cesarean sections= (primary Cesarean sections/all births-repeat Cesarean sections-VBACs) x 100. 6. Percentage repeat Cesarean sections= (repeat Cesarean sections/ (repeat Cesarean sections + VBACs)) x100. 7. Percentage VBACs= (VBAC deliveries/ (repeat Cesarean sections + VBAC)) x 100. 8. This percentage is based on less than 40 total births (in denominator) and should be interpreted with caution. 9. Calculations based on fewer than five events are excluded.

Table 24. Cesarean Section Deliveries for Singleton Births by Licensed Maternity Facility[1] and Number of Previous Births, Massachusetts: 2003

Facility	First Birth			Second or Later Birth without prior C-section			Second or Later Birth with prior C-section		
	Births[2]	C-section		Births[2]	C-section		Births[2]	C-section	
		n	%[3]		n	%[3]		n	%[3]
State Total	**34,505**	**10,050**	**29.1**	**32,978**	**2,900**	**8.8**	**9,378**	**8,184**	**87.3**
Anna Jaques Hspt.	297	90	30.3	375	27	7.2	104	85	81.7
Baystate Med. Ctr.	1,618	450	27.8	1,785	145	8.1	454	380	83.7
Berkshire Med. Ctr.	351	75	21.4	334	23	6.9	79	58	73.4
Beth Israel Deaconess Med. Ctr.	2,198	765	34.8	1,799	199	11.1	689	589	85.5
Beverly Hspt.	949	268	28.2	988	77	7.8	284	243	85.6
Boston Med. Ctr.	900	226	25.1	919	112	12.2	218	190	87.2
Brigham And Women's Hspt.	4,227	1,229	29.1	3,313	301	9.1	968	774	80.0
Brockton Hspt.	531	165	31.1	511	66	12.9	137	108	78.8
Cambridge Hspt.	578	145	25.1	319	28	8.8	114	93	81.6
Cape Cod Hspt.	427	108	25.3	404	22	5.4	140	120	85.7
Caritas Good Samaritan Med. Ctr.	381	144	37.8	471	49	10.4	133	130	97.7
Caritas Norwood Hspt.	284	110	38.7	263	19	7.2	80	70	87.5
Caritas St. Elizabeth's	624	214	34.3	530	51	9.6	185	168	90.8
Charlton Memorial Hspt.	752	216	28.7	734	83	11.3	184	165	89.7
Cooley Dickinson Hspt.	383	108	28.2	380	24	6.3	114	93	81.6
Emerson Hspt.	524	187	35.7	572	44	7.7	167	151	90.4
Fairview Hspt.	78	20	25.6	69	3	--[5]	25	24	96.0
Falmouth Hspt.	289	82	28.4	280	24	8.6	65	65	100.0
Franklin Med. Ctr.	195	55	28.2	201	9	4.5	54	41	75.9
Harrington Memorial Hspt.	188	50	26.6	201	16	8.0	58	49	84.5
Heywood Memorial Hspt.	240	51	21.3	276	11	4.0	62	44	71.0
Holy Family Hspt. And Med. Ctr.	596	239	40.1	568	58	10.2	188	179	95.2
Holyoke Hspt.	242	47	19.4	254	28	11.0	55	45	81.8
Jordan Hspt.	362	89	24.6	282	15	5.3	68	65	95.6
Lawrence General Hspt.	663	157	23.7	768	56	7.3	262	247	94.3
Leominster Hspt.	516	115	22.3	537	36	6.7	138	126	91.3
Lowell General Hspt.	782	209	26.7	842	82	9.7	250	218	87.2
Martha's Vineyard Hspt.	63	14	22.2	51	5	9.8	21	20	95.2
Mary Lane Hspt.	53	17	32.1	75	11	14.7	18	18	100.0

Table 24 (cont'd). Cesarean Section Deliveries for Singleton Births by Licensed Maternity Facility and Number of Previous Births, Massachusetts: 2003

Facility	First Birth			Second or Later Birth without prior C-section			Second or Later Birth with prior C-section		
	Births[2]	C-section		Births[2]	C-section		Births[2]	C-section	
		n	%[3]		n	%[3]		n	%[3]
Massachusetts General Hspt.	1,696	507	29.9	1,378	141	10.2	300	257	85.7
Melrose-Wakefield Hspt.	708	208	29.4	682	79	11.6	273	258	94.5
Mercy Med. Ctr.	545	140	25.7	710	47	6.6	135	113	83.7
Metrowest Med. Cntr.-Framingham Union Campus	1,046	361	34.5	823	74	9.0	277	277	100.0
Milford-Whitinsville Regional Hspt.	393	135	34.4	385	37	9.6	107	95	88.8
Morton Hspt.	194	44	22.7	223	19	8.5	87	80	92.0
Mount Auburn Hspt.	819	218	26.6	670	34	5.1	183	147	80.3
Nantucket Cottage Hspt.	48	13	27.1	36	0	0.0	12	12	100.0
Newton-Wellesley Hspt.	1,271	446	35.1	1,233	102	8.3	407	371	91.2
North Adams Regional Hspt.	124	54	43.5	129	12	9.3	41	36	87.8
North Shore Med. Cntr. - Salem Hspt.	777	233	30.0	784	87	11.1	197	177	89.8
Saint Vincent Hspt.	786	205	26.1	781	50	6.4	190	148	77.9
Saints Memorial Medical Ctr.	337	115	34.1	281	29	10.3	86	83	96.5
South Shore Hspt.	1,613	455	28.2	1,814	144	7.9	519	470	90.6
St. Luke's Hspt.	615	146	23.7	685	47	6.9	181	159	87.8
Sturdy Memorial Hspt.	429	146	34.0	458	40	8.7	144	136	94.4
Tobey Hspt.	186	26	14.0	219	13	5.9	35	28	80.0
Tufts-New England Med. Ctr. Hspt.	549	174	31.7	495	60	12.1	175	155	88.6
UMass Memorial Med. Ctr. - West Campus	2,002	479	23.9	1,731	175	10.1	441	375	85.0
Winchester Hspt.	882	299	33.9	992	86	8.7	264	249	94.3

NOTES: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. 2. Occurrence births (See Glossary for definition.) 3. The percentage of Cesarean births reported is not adjusted for risk factors such as mother's age, birthweight, or complications of labor and delivery, which would influence the number of procedures in a particular facility. Caution should be used when comparing unadjusted percentages. 4. This percentage is based on less than 40 total births (in denominator) and should be interpreted with caution. 5. Calculations based on fewer than five events are excluded.

CHAPTER 8

BIRTHS BY HOSPITAL AND COMMUNITY

Low Birthweight by Facility

In 2003, at least 10% of the births at six hospitals were low birthweight. These hospitals were (Table 25): Brigham and Women's Hospital (10.3%), Beth Israel Deaconess Medical Center (11.4%), UMass Memorial Medical Center - West Campus (11.4%), Baystate Medical Center (12.5%), Caritas St. Elizabeth's Medical Center of Boston (13.9%), and, Tufts-New England Medical Center Hospital (26.1%)

Publicly Funded Delivery by Facility

In eight hospitals, 50% or more of the deliveries were paid with public funds: St. Luke's Hospital (51.8%), Lawrence General Hospital (52.9%), Mary Lane Hospital (54.4%), Cambridge Hospital (56.7%), Brockton Hospital (57.1%), Mercy Medical Center (57.3%), Holyoke Hospital (65.5%), and, Boston Medical Center (85.3%). In five facilities, less than 10% of deliveries were paid with public funds: Birthplace at Wellesley (0%), Newton-Wellesley Hospital (2.4%), Emerson Hospital (3.7%), Winchester Hospital (5.3%), and South Shore Hospital (9.2%) (Table 25).

Adequacy of Prenatal Care by Facility

The facilities with the lowest reported rate of adequacy of prenatal care among mothers delivering in 2003 (i.e. less than 65%) were Boston Medical Center (52.3%), Tobey Hospital (52.9%), Berkshire Medical Center (56.1%), and Lowell General Hospital (63.8%). Beverly Hospital (95.1%), Saint Vincent Hospital (95.4%), North Shore Birth Center (95.5%), and Brigham and Women's Hospital (98.3%) reported the highest rate of mothers with adequate prenatal care (Table 25).

Low Birthweight in the 30 Largest Massachusetts Cities and Towns

In 2003, among the 30 largest cities and towns in the Commonwealth, low birthweight rates were highest in Peabody (11.4%), Lowell (10.5%), Brockton (10.2%), New Bedford (10%), Fall River (9.8%), Methuen (9.8%), and Springfield (9.5%). These communities had low birthweight rates 20% higher than the statewide rate of 7.6% (numbers are shown in Table 26A and rates are shown in Table 3A).

Table 25. Birth Characteristics by Licensed Maternity Facility[1], Massachusetts: 2003

Facility	Location	Occurrence Births[2] (n)	Low Birthweight[3] (%)	Public Payment for Delivery[4] (%)	Adequate Prenatal Care[5] (%)
STATE TOTAL[6]		**81,310**	**7.6**	**28.2**	**84.5**
Anna Jaques Hspt.	Newburyport	792	3.4	19.5	90.3
Baystate Medical Ctr.	Springfield	4,283	12.5	42.7	81.7
Berkshire Medical Ctr.	Pittsfield	788	5.3	38.4	56.1
Beth Israel Deaconess Medical Ctr.	Boston	5,035	11.4	17.7	93.4
Beverly Hspt.	Beverly	2,312	5.1	25.7	95.1
Birthplace At Wellesley	Wellesley	120	0.0	0.0	88.3
Boston Medical Ctr.	Boston	2,087	9.5	85.3	52.3
Brigham And Women's Hspt.	Boston	9,402	10.3	17.2	98.3
Brockton Hspt.	Brockton	1,219	8.2	57.1	79.0
Cambridge Birth Ctr.	Cambridge	92	--[7]	31.5	70.7
Cambridge Hspt.	Cambridge	1,066	2.7	56.7	76.4
Cape Cod Hspt.	Barnstable	1,001	2.9	38.1	88.3
Caritas Good Samaritan Medical Ctr.	Brockton	1,021	6.2	45.7	68.9
Caritas St. Elizabeth's Medical Ctr.	Boston	1,464	13.9	16.8	86.9
Caritas Norwood Hspt.	Norwood	644	3.7	15.4	82.7
Charlton Memorial Hspt.	Fall River	1,729	7.3	44.8	89.8
Cooley Dickinson Hspt.	Northampton	911	2.3	24.4	92.4
Emerson Hspt.	Concord	1,319	4.4	3.7	82.7
Fairview Hspt.	Great Barrington	174	2.9	47.7	79.7
Falmouth Hspt.	Falmouth	641	3.9	30.1	79.9
Franklin Medical Ctr.	Greenfield	464	3.4	37.7	86.4
Harrington Memorial Hspt.	Southbridge	462	1.8	47.7	88.9
Heywood Memorial Hspt.	Gardner	597	3.2	32.5	80.5
Holy Family Hospital And Medical Ctr.	Methuen	1,386	4.5	14.9	84.5
Holyoke Hspt.	Holyoke	563	3.6	65.5	79.4
Jordan Hspt.	Plymouth	738	4.7	25.5	71.0
Lawrence General Hspt.	Lawrence	1,742	7.1	52.9	87.7
Leominster Hspt.	Leominster	1,215	3.8	38.4	85.4
Lowell General Hspt.	Lowell	1,951	6.6	37.1	63.8
Martha's Vineyard Hspt.	Oak Bluffs	137	--[7]	37.5	89.8
Mary Lane Hspt.	Ware	148	3.4	54.4	81.8
Massachusetts General Hspt.	Boston	3,587	8.1	27.0	87.4
Melrose-Wakefield Hspt.	Melrose	1,721	5.1	19.1	89.8

Table 25. (cont'd) Births Characteristics by Licensed Maternity Facility[1], Massachusetts: 2003

Facility	Location	Occurrence Births[2] (n)	Low Birthweight[3] (%)	Public Payment for Delivery[4] (%)	Adequate Prenatal Care[5] (%)
Mercy Medical Ctr.	Springfield	1,406	4.3	57.3	80.3
Metrowest Medical Ctr.-Framingham Union Campus	Framingham	2,211	5.5	26.3	91.3
Milford-Whitinsville Regional Hspt.	Milford	904	2.9	16.5	88.9
Morton Hspt.	Taunton	523	5.3	45.2	76.7
Mount Auburn Hspt.	Cambridge	1,730	4.5	15.8	92.2
Nantucket Cottage Hspt.	Nantucket	96	5.2	29.2	78.9
Newton-Wellesley Hspt.	Newton	3,072	4.5	2.4	77.0
North Adams Regional Hspt.	North Adams	303	5.0	41.7	92.4
North Shore Birth Ctr.	Beverly	88	0.0	13.6	95.5
North Shore Medical Ctr. - Salem Hspt.	Salem	1,849	6.7	40.2	73.1
Saint Vincent Hspt.	Worcester	1,842	4.8	11.3	95.4
Saints Memorial Medical Ctr.	Lowell	724	5.9	34.2	83.1
South Shore Hspt.	Weymouth	4,162	5.7	9.2	93.3
St. Luke's Hspt.	New Bedford	1,527	6.9	51.8	80.7
Sturdy Memorial Hspt.	Attleboro	1,056	4.7	17.0	72.3
Tobey Hspt.	Wareham	525	3.6	28.2	52.9
Tufts-New England Medical Ctr. Hspt.	Boston	1,419	26.1	33.1	87.1
UMass Memorial Medical Center - West Campus	Worcester	4,473	11.4	32.3	69.4
Winchester Hspt.	Winchester	2,261	5.3	5.3	86.9
Other Hospitals		10	55.6	42.9	42.9
Home Births, En route, Other		318	9.7	20.3	67.3

NOTES: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. 2. See Glossary for definition of occurrence births. 3. Less than 2,500 grams (5.5 lbs.) 4. Public payment for delivery includes Medicaid/MassHealth, Commonhealth, Medicare, Healthy Start, other government programs, and free care. 5. Based on the APNCU Index. 6. The percentages provided in this row are based on occurrence births and may differ from data presented elsewhere in this book which are based on resident births. 7. Calculations based on values of 1-4 for medical characteristics of facilities with less than 200 births are suppressed based Guidelines for Release of Births Data, Center for Health Information, Statistics, Research and Evaluation, Massachusetts Department of Public Health.

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
STATE TOTAL	**81,310**	**80,167**	**6,115**	**4,639**	**383**	**285**
Abington	0	212	13	9	0	0
Acton	0	224	12	0	0	0
Acushnet	0	104	--[1]	4	1	1
Adams	0	80	--[1]	8	0	0
Agawam	0	256	19	9	2	2
Alford	0	5	0	0	0	0
Amesbury	1	206	22	7	0	0
Amherst	2	184	11	10	0	0
Andover	2	293	18	3	2	0
Aquinnah (Gay Head)	0	0	0	0	0	0
Arlington	2	560	33	7	6	5
Ashburnham	0	62	--[1]	2	0	0
Ashby	0	37	0	2	0	0
Ashfield	1	15	--[1]	0	0	0
Ashland	0	260	22	1	2	1
Athol	1	141	9	15	1	1
Attleboro	1,056	622	46	45	0	0
Auburn	2	174	18	2	1	1
Avon	0	57	--[1]	1	0	0
Ayer	1	111	14	3	0	0
Barnstable	1,005	467	31	29	5	4
Barre	0	62	7	1	0	0
Becket	0	10	0	1	0	0
Bedford	0	142	13	2	0	0
Belchertown	2	159	19	6	0	0
Bellingham	1	234	25	12	1	1
Belmont	1	282	14	1	1	1
Berkley	0	74	5	4	0	0
Berlin	0	30	--[1]	0	0	0
Bernardston	0	16	--[1]	0	0	0
Beverly	2,400	480	41	15	1	1
Billerica	1	491	37	14	2	0
Blackstone	0	95	--[1]	5	0	0
Blandford	0	18	--[1]	5	0	0
Bolton	0	52	--[1]	1	0	0
Boston	23,028	7,823	700	573	48	37
Bourne	1	234	20	12	3	2
Boxborough	0	42	--[1]	1	0	0
Boxford	0	65	--[1]	0	0	0
Boylston	1	53	6	0	0	0
Braintree	0	410	24	6	0	0

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Brewster	1	65	--[1]	2	0	0
Bridgewater	0	265	15	4	2	2
Brimfield	1	23	--[1]	3	0	0
Brockton	2,241	1,493	152	148	8	6
Brookfield	0	32	--[1]	2	0	0
Brookline	0	691	51	1	2	2
Buckland	0	21	0	0	0	0
Burlington	1	290	16	1	0	0
Cambridge	2,897	1,079	73	27	3	3
Canton	0	277	32	6	5	5
Carlisle	2	35	--[1]	1	0	0
Carver	0	122	9	10	0	0
Charlemont	0	10	0	0	0	0
Charlton	1	151	9	9	0	0
Chatham	0	33	0	2	0	0
Chelmsford	3	370	32	4	2	1
Chelsea	0	657	46	68	3	2
Cheshire	0	30	--[1]	4	0	0
Chester	0	15	0	3	0	0
Chesterfield	0	8	0	0	0	0
Chicopee	2	600	41	59	4	2
Chilmark	1	7	0	0	0	0
Clarksburg	1	9	0	0	0	0
Clinton	1	192	13	14	1	1
Cohasset	0	107	7	0	0	0
Colrain	1	18	0	0	0	0
Concord	1,321	127	8	1	1	1
Conway	0	21	--[1]	0	0	0
Cummington	1	12	--[1]	1	0	0
Dalton	0	77	9	6	0	0
Danvers	1	232	20	7	2	1
Dartmouth	0	260	15	10	2	2
Dedham	0	294	21	8	0	0
Deerfield	1	37	0	0	0	0
Dennis	0	93	--[1]	4	1	1
Dighton	0	79	7	2	0	0
Douglas	0	123	10	4	0	0
Dover	1	64	5	0	0	0
Dracut	1	355	31	13	2	1
Dudley	0	119	12	2	0	0
Dunstable	1	41	--[1]	3	0	0
Duxbury	0	161	9	0	0	0
East Bridgewater	1	150	10	2	1	1
East Brookfield	0	34	--[1]	3	1	1
East Longmeadow	0	146	12	1	2	1

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Eastham	0	42	--[1]	1	0	0
Easthampton	3	171	9	11	1	1
Easton	0	236	10	5	0	0
Edgartown	0	47	--[1]	0	1	0
Egremont	1	11	0	0	0	0
Erving	0	20	--[1]	2	0	0
Essex	0	37	--[1]	0	0	0
Everett	1	592	46	41	2	1
Fairhaven	0	169	6	12	0	0
Fall River	1,731	1,262	123	163	7	5
Falmouth	643	304	21	19	3	2
Fitchburg	0	587	49	75	3	1
Florida	0	4	0	0	0	0
Foxborough	0	206	16	2	1	1
Framingham	2,214	1,000	69	38	5	4
Franklin	2	436	19	8	1	1
Freetown	0	82	11	4	0	0
Gardner	598	249	13	24	1	1
Georgetown	0	98	9	0	0	0
Gill	0	10	0	1	0	0
Gloucester	0	309	19	13	0	0
Goshen	1	16	0	0	0	0
Gosnold	0	2	0	0	0	0
Grafton	3	239	20	5	2	2
Granby	1	58	--[1]	0	0	0
Granville	0	14	0	0	1	1
Great Barrington	179	68	5	2	0	0
Greenfield	467	192	18	24	1	0
Groton	1	124	12	3	0	0
Groveland	0	74	--[1]	1	1	1
Hadley	0	50	7	1	0	0
Halifax	0	80	14	10	3	2
Hamilton	0	107	9	0	0	0
Hampden	0	35	--[1]	1	1	1
Hancock	0	5	0	0	0	0
Hanover	0	158	21	1	1	1
Hanson	0	130	5	6	0	0
Hardwick	0	29	7	2	0	0
Harvard	0	41	--[1]	0	1	0
Harwich	0	99	5	2	0	0
Hatfield	0	24	0	0	0	0
Haverhill	1	897	49	53	2	1
Hawley	0	0	0	0	0	0
Heath	0	5	0	0	0	0
Hingham	0	270	20	3	2	2

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Hinsdale	1	19	--[1]	1	0	0
Holbrook	0	118	9	4	1	1
Holden	0	196	11	6	1	1
Holland	0	25	5	1	0	0
Holliston	1	178	10	0	0	0
Holyoke	569	639	58	139	2	1
Hopedale	0	73	--[1]	1	0	0
Hopkinton	2	215	12	4	3	3
Hubbardston	0	53	--[1]	1	0	0
Hudson	1	217	16	11	2	2
Hull	0	116	6	1	2	2
Huntington	2	29	--[1]	4	0	0
Ipswich	1	152	27	1	5	5
Kingston	0	179	6	3	1	0
Lakeville	0	112	7	3	1	0
Lancaster	0	72	--[1]	1	0	0
Lanesborough	0	15	0	1	0	0
Lawrence	1,750	1,373	117	236	8	7
Lee	0	61	--[1]	2	1	0
Leicester	0	117	9	4	1	1
Lenox	2	34	--[1]	2	0	0
Leominster	1,215	568	33	43	4	2
Leverett	1	6	0	0	0	0
Lexington	1	219	11	0	0	0
Leyden	0	3	0	0	0	0
Lincoln	1	90	--[1]	0	1	0
Littleton	1	116	8	4	0	0
Longmeadow	1	132	13	0	0	0
Lowell	2,680	1,696	178	174	20	14
Ludlow	1	190	13	7	0	0
Lunenburg	0	90	9	3	1	1
Lynn	2	1,499	105	145	13	8
Lynnfield	0	138	12	1	3	3
Malden	2	801	60	29	3	3
Manchester-by-the-Sea	0	61	7	2	1	1
Mansfield	0	384	33	6	1	1
Marblehead	0	216	19	1	0	0
Marion	0	50	--[1]	1	0	0
Marlborough	1	576	47	24	1	1
Marshfield	1	327	13	4	0	0
Mashpee	0	147	6	6	1	1
Mattapoisett	0	47	5	1	0	0
Maynard	1	167	11	5	0	0
Medfield	1	129	9	0	0	0
Medford	4	584	47	15	1	0

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Medway	0	166	--[1]	2	0	0
Melrose	1,723	342	17	6	4	3
Mendon	0	61	--[1]	1	0	0
Merrimac	0	68	--[1]	0	0	0
Methuen	1,386	612	60	29	1	1
Middleborough	1	284	19	17	0	0
Middlefield	0	5	0	0	0	0
Middleton	0	93	--[1]	1	1	0
Milford	906	384	30	15	0	0
Millbury	2	139	11	4	1	1
Millis	0	113	7	1	0	0
Millville	0	36	--[1]	1	0	0
Milton	0	291	13	5	1	1
Monroe	0	1	0	0	0	0
Monson	0	85	6	2	0	0
Montague	3	95	5	10	0	0
Monterey	1	6	0	0	0	0
Montgomery	0	8	--[1]	0	0	0
Mount Washington	0	0	0	0	0	0
Nahant	2	40	--[1]	0	0	0
Nantucket	100	151	14	2	0	0
Natick	2	501	39	3	0	0
Needham	0	366	16	1	2	1
New Ashford	0	1	0	0	0	0
New Bedford	1,533	1,317	130	169	12	7
New Braintree	1	19	--[1]	1	0	0
New Marlborough	0	10	0	0	0	0
New Salem	0	7	0	0	0	0
Newbury	0	67	--[1]	0	0	0
Newburyport	797	224	13	2	4	4
Newton	3,074	759	54	3	2	2
Norfolk	1	118	6	2	0	0
North Adams	304	152	16	21	1	1
North Andover	0	353	23	4	1	1
North Attleboro	1	345	18	6	2	2
North Brookfield	1	43	--[1]	3	1	1
North Reading	0	150	13	1	0	0
Northampton	916	219	9	12	0	0
Northborough	0	183	10	2	0	0
Northbridge	0	213	16	9	2	1
Northfield	0	23	--[1]	2	0	0
Norton	0	210	11	11	0	0
Norwell	0	95	9	0	0	0
Norwood	647	413	31	9	3	3
Oak Bluffs	137	35	--[1]	0	0	0

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Oakham	0	28	0	0	0	0
Orange	0	81	6	6	0	0
Orleans	0	21	--[1]	1	0	0
Otis	0	13	0	0	0	0
Oxford	0	142	10	5	3	3
Palmer	2	159	10	9	1	0
Paxton	0	52	--[1]	0	0	0
Peabody	1	527	60	24	4	4
Pelham	0	9	0	0	0	0
Pembroke	2	248	14	3	1	1
Pepperell	0	171	13	7	0	0
Peru	0	10	0	1	0	0
Petersham	0	5	0	0	0	0
Phillipston	0	17	--[1]	1	0	0
Pittsfield	790	527	44	72	4	2
Plainfield	1	2	0	0	0	0
Plainville	0	106	6	3	0	0
Plymouth	744	734	46	28	5	5
Plympton	0	38	5	2	2	2
Princeton	0	28	--[1]	0	0	0
Provincetown	0	15	--[1]	0	0	0
Quincy	4	1,181	75	43	6	5
Randolph	1	412	40	10	3	3
Raynham	0	151	10	5	0	0
Reading	2	289	19	2	0	0
Rehoboth	0	88	9	3	0	0
Revere	0	706	51	50	1	1
Richmond	0	11	--[1]	0	0	0
Rochester	0	53	--[1]	4	0	0
Rockland	0	221	22	6	0	0
Rockport	0	38	--[1]	0	0	0
Rowe	0	3	0	0	0	0
Rowley	0	63	--[1]	1	0	0
Royalston	0	14	--[1]	0	0	0
Russell	2	24	--[1]	1	1	0
Rutland	1	98	6	3	0	0
Salem	1,854	564	36	34	2	1
Salisbury	0	93	--[1]	10	0	0
Sandisfield	0	6	--[1]	0	0	0
Sandwich	1	207	8	4	0	0
Saugus	0	295	22	6	0	0
Savoy	0	7	--[1]	0	0	0
Scituate	2	239	26	3	0	0
Seekonk	2	125	9	3	0	0
Sharon	0	162	11	0	0	0

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Sheffield	1	27	--[1]	0	0	0
Shelburne	1	23	0	1	0	0
Sherborn	0	43	6	0	0	0
Shirley	0	81	10	1	1	1
Shrewsbury	1	439	39	5	0	0
Shutesbury	3	17	0	1	0	0
Somerset	0	140	11	4	0	0
Somerville	6	924	80	46	2	2
South Hadley	0	121	--[1]	4	0	0
Southampton	1	53	--[1]	5	0	0
Southborough	0	132	10	1	2	2
Southbridge	462	270	14	37	4	1
Southwick	0	84	6	5	1	1
Spencer	1	122	--[1]	9	0	0
Springfield	5,699	2,423	230	479	11	6
Sterling	0	93	5	0	0	0
Stockbridge	0	11	--[1]	0	0	0
Stoneham	0	260	16	3	2	1
Stoughton	0	344	21	10	3	1
Stow	2	73	7	0	1	1
Sturbridge	0	120	5	0	1	0
Sudbury	1	219	11	0	0	0
Sunderland	0	42	6	2	0	0
Sutton	0	99	8	3	0	0
Swampscott	1	154	16	2	1	0
Swansea	1	155	15	10	0	0
Taunton	524	742	63	58	4	4
Templeton	2	70	6	8	2	2
Tewksbury	1	370	21	8	0	0
Tisbury	1	47	--[1]	2	0	0
Tolland	0	3	0	0	0	0
Topsfield	0	56	--[1]	0	0	0
Townsend	2	119	6	5	0	0
Truro	1	16	0	0	0	0
Tyngsborough	0	140	7	5	0	0
Tyringham	0	2	0	0	0	0
Upton	1	94	8	2	0	0
Uxbridge	0	159	5	2	2	1
Wakefield	0	313	31	2	2	2
Wales	0	27	--[1]	1	0	0
Walpole	1	297	16	4	0	0
Waltham	3	736	63	26	4	4
Ware	149	121	8	18	1	0
Wareham	526	247	16	21	1	0
Warren	0	74	5	7	1	1

Table 26A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2003

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Warwick	0	6	0	0	0	0
Washington	0	7	0	0	0	0
Watertown	2	414	33	5	0	0
Wayland	1	131	10	0	1	0
Webster	1	236	14	14	0	0
Wellesley	122	318	15	0	1	1
Wellfleet	0	33	--[1]	0	0	0
Wendell	0	4	0	2	0	0
Wenham	0	42	--[1]	1	0	0
West Boylston	0	60	--[1]	3	0	0
West Bridgewater	0	85	--[1]	1	0	0
West Brookfield	0	32	--[1]	4	0	0
West Newbury	0	29	--[1]	0	0	0
West Springfield	0	313	18	23	3	3
West Stockbridge	0	11	0	0	0	0
West Tisbury	0	22	--[1]	1	0	0
Westborough	4	243	17	5	1	1
Westfield	2	436	26	24	0	0
Westford	0	286	25	0	0	0
Westhampton	0	21	--[1]	1	0	0
Westminster	0	68	--[1]	3	0	0
Weston	0	92	8	1	1	0
Westport	0	124	12	10	1	1
Westwood	0	179	16	0	1	1
Weymouth	4,170	729	60	28	6	5
Whately	0	7	0	1	0	0
Whitman	0	189	16	10	0	0
Wilbraham	0	122	19	2	0	0
Williamsburg	1	26	--[1]	3	0	0
Williamstown	1	51	--[1]	1	0	0
Wilmington	0	296	19	3	0	0
Winchendon	1	109	9	9	0	0
Winchester	2,264	250	22	2	0	0
Windsor	0	4	0	0	0	0
Winthrop	0	176	8	3	0	0
Woburn	0	489	32	14	3	2
Worcester	6,323	2,588	233	263	11	8
Worthington	1	11	0	1	0	0
Wrentham	1	135	8	2	1	1
Yarmouth	0	220	8	14	0	0

1. Values of 1-4 for medical characteristics of communities with less than 200 births are suppressed based on Guidelines for Release of Birth Data, Center for Health Information, Statistics, Research and Evaluation, Massachusetts Department of Public Health. 2. Births occurring in a geographical place (state, city/town) regardless of the residency of the mother. See Glossary for more details. 3. Births to mothers who report their usual place of residence as a particular geographical place (state, or city/town). See Glossary for more details. 4. Less than 2,500 grams (5.5 lbs.). 5. Death of a child whose age is less than one year. 6. Death of a child whose age is less than 28 days.

Table 26B. Birth Characteristics, Occurrence and Resident Births and Infant Deaths by County, Massachusetts: 2003

County Name	Occurrence Births[1]	Resident Births[2]			Deaths	
		Number	Low Birthweight[3]	Teen Births (15-19 years)	Infant[4]	Neonatal[5]
STATE TOTAL	**81,310**	**80,167**	**6,115**	**4,639**	**383**	**285**
Barnstable	1,652	1,996	110	96	13	10
Berkshire	1,281	1,284	98	122	6	3
Bristol	4,848	6,669	547	534	30	23
Dukes	139	160	7	3	1	0
Essex	8,199	9,555	735	599	52	39
Franklin	478	683	43	52	1	0
Hampden	6,279	5,777	485	774	29	18
Hampshire	1,081	1,299	77	77	2	1
Middlesex	16,225	18,469	1,402	572	80	59
Nantucket	100	151	14	2	0	0
Norfolk	4,952	8,353	563	168	38	33
Plymouth	3,518	6,305	485	301	30	24
Suffolk	23,028	9,362	805	694	52	40
Worcester	9,529	10,104	744	645	49	35

1. Births occurring in a geographical place (state, city/town) regardless of the residency of the mother. See Glossary for more details.
2. Births to mothers who report their usual place of residence as a particular geographical place (state, or city/town). See Glossary for more details. 3. Less than 2,500 grams (5.5 lbs.). 4. Death of a child whose age is less than one year. 5. Death of a child whose age is less than 28 days.

Table 26C. Birth Characteristics, Occurrence and Resident Births and Infant Deaths, Massachusetts Community Health Network Areas (CHNAs): 2003

Community Health Network Area (CHNA Number)	Occurrence Births[1]	Resident Births[2]			Deaths	
		Number	Low Birthweight[3]	Teen Births (15-19 years)	Infant[4]	Neonatal[5]
STATE TOTAL	**81,309**	**80,167**	**6,115**	**4,639**	**383**	**285**
Community Health Network of Berkshire County (1)	1,281	1,284	98	122	6	3
Upper Valley Health Web (Franklin County) (2)	479	860	56	68	2	1
Partnership for Health in Hampshire County (Northampton) (3)	1,079	1,270	76	73	2	1
The Community Health Connection (Springfield) (4)	5,704	3,822	339	537	23	15
Community Health Network of Southern Worcester County (5)	467	1,450	91	100	11	7
Community Partners for Health (Milford) (6)	910	2,173	130	65	6	4
Community Health Network of Greater Metro West (Framingham) (7)	2,234	5,242	365	108	20	17
Community Wellness Coalition (Worcester) (8)	6,332	4,057	352	292	17	14
Fitchburg/Gardner Community Health Network (9)	1,823	3,243	231	212	14	9
Greater Lowell Community Health Network (10)	2,687	3,749	334	221	26	16
Greater Lawrence Community Health Network (11)	3,138	2,724	220	273	13	9
Greater Haverhill Community Health Network (12)	799	1,884	113	74	7	6
Community Health Network North (Beverly/Gloucester) (13)	2,401	1,282	109	32	7	7
North Shore Community Health Network (14)	1,861	3,665	293	220	25	17
Greater Woburn/Concord/Littleton Community Health Network (15)	3,591	2,320	146	29	5	3
North Suburban Health Alliance (Medford/Malden/Melrose) (16)	1,732	3,331	249	99	14	10
Greater Cambridge/Somerville Community Health Network (17)	2,908	3,259	233	86	12	11
West Suburban Health Network (Newton/Waltham) (18)	3,200	2,808	198	39	11	9
Alliance for Community Health (Boston/Chelsea/Revere/Winthrop) (19)	23,028	10,053	856	695	54	42
Blue Hills Community Health Alliance (Greater Quincy) (20)	4,824	4,702	354	114	28	26
Four (For) Communities (Holyoke, Chicopee, Ludlow, Westfield) (21)	576	1,909	139	236	6	3
Greater Brockton Community Health Network (22)	2,242	3,149	250	194	15	11
South Shore Community Partners in Prevention (Plymouth) (23)	747	2,398	164	73	13	11
Greater Attleboro-Taunton Health & Education Response (24)	1,584	3,216	237	163	8	7
Partners for a Healthier Community (Fall River) (25)	1,732	1,681	161	187	8	6
Greater New Bedford Health & Human Services Coalition (26)	2,059	2,329	190	226	16	10
Cape and Islands Community Health Network (27)	1,891	2,307	131	101	14	10

1. Births occurring in a geographical place (state, city/town) regardless of the residency of the mother. See Glossary for more details. 2. Births to mothers who report their usual place of residence as a particular geographical place (state, city/town). See Glossary for more details. 3. Less than 2,500 grams (5.5 lbs.). 4. Death of a child whose age is less than one year. 5. Death of a child whose age is less than 28 days.

APPENDIX

TECHNICAL NOTES

1. DATA AVAILABILITY

This publication and other Department of Public Health publications and materials can be accessed on the Internet at:

http://www.state.ma.us/dph/pubstats.htm

Detailed information on 2003 births in Massachusetts, as well as access to other Department of Public Health data, is available on the Department's free, Internet-accessible data warehouse, **MassCHIP**. To register as a user, visit the MassCHIP website at http://masschip.state.ma.us, or call 1-888-MASCHIP (within MA only) or 617-624-5629.

2. DATA CAUTIONS

Limitations of small numbers:
Cells in some tables in this publication, and particularly those tables specific to the individual cities and towns, contain small numbers. Rates and proportions based on less than five observations are suppressed, and trends based upon small numbers should be interpreted cautiously.

Differences with previously published data
Numbers and rates in this publication may differ from those contained in previous reports because of updates of birth and death certificate files, or release of the most up-to-date population estimates for a given year (see Technical Note #4 for details on population files).

Self-reported data
Many items used in this publication, such as maternal smoking, education, and race/ethnicity are self-reported, and are subject to the usual limitations of this type of information.

3. CHANGES IN THE COLLECTION OF RACE AND ETHNICITY INFORMATION

Assignment of an Infant's Race/Ethnicity
Prior to 1989, the race/ethnicity of an infant was assigned by combining information on the race/ethnicity of the mother and the race/ethnicity of the father. Since 1989, Massachusetts has followed the recommendation of the National Center for Health Statistics of classifying births according to the self-reported race/ethnicity of the mother. Therefore, beginning in 1989, the race/ethnicity of an infant is identical to the self-reported race/ethnicity of the infant's mother.

Addition of Information on Hispanic Ethnicity
Beginning in 1986, an identifier for Hispanic ethnicity was added to the birth certificate; in 1989, an identifier for Hispanic ethnicity was added to the death certificate. Prior to these changes, most infants and mothers of Hispanic ethnicity were included with whites and it was not possible to accurately calculate Hispanic-specific rates of natality and mortality.

The ethnicity categories available on the Parent Worsheet for birth certificate are:

- Puerto Rican
- Dominican
- Mexican
- Cuban
- Colombian
- Salvadoran
- Other Central American
- Other South American
- Other Hispanic
- Chinese
- Vietnamese
- Cambodian
- Asian Indian
- Korean
- Filipino
- Japanese
- Laotian
- Pakistani
- Thai
- Hawaiian
- Other Asian/PI
- Cape Verdean
- Brazilian
- Other Portuguese
- Haitian
- Jamaican
- Barbadian
- Other West Indian/Caribbean Islander
- African American
- Nigerian
- Other African
- Lebanese
- Iranian
- Israeli
- Other Middle Eastern
- Native American
- European
- Native American
- European

4. POPULATION ESTIMATES

The source of the 2000 population estimates for Massachusetts is the Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE) file. This file is based upon the U.S. Census 2000 SF1 file (released June, 2001) for Massachusetts, which contains data on population and housing for the 351 towns, 14 counties, and the state overall.

The MRACE file was derived from the Census 2000 file by allocating persons who indicated “some other race” or multiple races to the conventional DPH race categories: “White”, “Black or African American”, “Asian,” “Native American,” and "Hispanic." In Census 2000, unlike previous censuses, respondents were able to classify themselves by Hispanic ethnicity and by single or multi-race categories, including “some other race.” In order to make the DPH population 2000 file consistent with previous years’ population files, the MRACE file maintains the prior mutually exclusive race and Hispanic categories.

Population-based rates between 1991 and 1999 in this publication were calculated as follows:

- 1991-1998: Massachusetts Institute for Social and Economic Research (MISER) Population Estimates;

- 1999: Massachusetts Dept. of Public Health 1999 Population Estimate, which is a linear interpolation between the preliminary DPH Population 2000 file and the MISER 1998 Population Estimate.

5. DEFINITION AND IDENTIFICATION OF PREGNANCY-ASSOCIATED AND MATERNAL DEATHS

There are various ways to categorize a woman who dies during pregnancy, childbirth, or in the postpartum period. Two components are included in every definition of maternal death: the timing

of death in relation to the pregnancy and birth, and the causes of death. Two definitions are used in this report: maternal death and pregnancy-associated death. The traditional definition of maternal death can be found in the World Health Organization's *International Classification of Diseases* (ICD). WHO defines maternal deaths as women who died during pregnancy or within 42 days of delivery from causes related to pregnancy, childbirth or its management. Deaths from accidental or incidental causes are excluded. The National Center for Health Statistics uses the WHO definition to conduct surveillance on maternal death in the US.

Maternal deaths are restricted to women whose underlying causes of death were coded with ICD-9 codes 630-676 (from 1990-1998), or with ICD-10 codes O00-O99 (1999 forward).

The definition of a pregnancy-associated death was developed in 1986 by the Maternal Mortality Study Group, which is jointly chaired by American College of Obstetrics and Gynecology (ACOG) and the Centers for Disease Control and Prevention (CDC). Pregnancy-associated deaths differ from maternal deaths in two fundamental ways: all deaths are included irrespective of cause, and deaths that occurred between 42 and 364 days after delivery also are included.

6. CHANGE IN MEASUREMENT OF ADEQUACY OF PRENATAL CARE

Change in Adequacy of Prenatal Care Indicator since Massachusetts Births 2001:
(This discussion is based on excerpts from "An Overview of the APNCU Index" by Milton Kotelchuck, Sept. 1994, available online at:
http://www.mchlibrary.info/databases/HSNRCPDFs/Overview_APCUIndex.pdf. Accessed December 2003).

Beginning with *Massachusetts Births 2001*, adequacy of prenatal care is being measured using a new method. The Adequacy of Prenatal Care Utilization (APNCU) Index, developed by Dr. Milton Kotelchuck, has replaced the Kessner Index, which had been used in the *Advanced Data Births* and *Massachusetts Births* series. The APNCU Index is the standard used in Healthy People 2010 and by the majority of states. It improves upon the Kessner Index in various ways, the most important being the ability to distinguish between inadequate prenatal care due to the timing of initiation and inadequate care due to insufficient prenatal care visits. The APNCU Index also improves upon the Kessner Index by correcting some of its principal faults. First, the APNCU Index more accurately assesses adequacy of visits for term pregnancies; the Kessner Index characterizes 9 or more visits as adequate, due to an early computer database limitation, which only allowed for a single-digit number to record prenatal care visits. Other faults of the Kessner Index include its bias towards measurement of adequacy of initiation of care, and its various computational algorithms due to inadequate initial documentation.

Table 1 of this report provides a comparison of data on adequacy of prenatal care from 1996-2003 as measured by these two separate indices. Below are the definitions for the APNCU Index categories and its two component indices (initiation and received services), and the definition of the

Kessner Index categories. Also below is a short summary of the major differences in classification of adequacy of prenatal care using the Kessner Index and the APNCU Index.

The APNCU Index characterizes prenatal care (PNC) utilization by measuring two distinct components of prenatal care -- adequacy of initiation and adequacy of received services (visits). Each of these components is measured as an independent index, and the APNCU Index is a summary of these 2 component indices. As with the Kessner Index, the APNCU Index does not assess quality of the prenatal care that is delivered, only its utilization.

Adequacy of Prenatal Care Utilization (APNCU) Index: Definition of Categories

Category	Month Prenatal Care Began	% of Expected[1] Prenatal Care
Adequate Intensive	1, 2, 3, or 4	110% or more
Adequate Basic	1, 2, 3, or 4	80 – 109%
Intermediate	1, 2, 3, or 4	50 – 79%
Inadequate	Month 5 or later	Less than 50%
Unknown	Prenatal care information not recorded	

Component Indices of the APNCU Index: Definitions of Categories

Component Indices and Summary Index

The first component index is "Adequacy of Initiation," which describes the adequacy of when prenatal care began during pregnancy. The assumption underlying this scale is that the earlier PNC begins the better. The month or trimester prenatal care begins is widely used as a measure to assess the adequacy of timing of initiation of PNC, since it accurately and succinctly describes when PNC begins. The APNCU Index uses this measure to determine the “adequacy of initiation.”

The second component index, "Adequacy of Received Services” (visits), characterizes the adequacy of received PNC visits during the time period after prenatal care is begun until the delivery. This component attempts to characterize if the woman received the appropriate number of prenatal care visits for the time period in which she received PNC services. [The appropriate number of visits is based on recommendations of the American College of Obstetricians and Gynecologists for an uncomplicated pregnancy. For example, a woman beginning prenatal care during the first month of pregnancy who delivers during the 40th week of gestation (and has no complications with her pregnancy) should receive 14 visits].

The two component indices are measured independently from one another, and can be used as separate indices, since the policy and practice issues underlying whether women are beginning care early and whether they are receiving the recommended amount of visits may be quite distinct. However, because of the popularity and utility of using one overall adequacy of PNC index, the two component indices are combined into a single summary index – the “Adequacy of Prenatal Care Utilization (APNCU) Index.”

Index Categories

Both component indices and the summary index (APNCU Index) characterize PNC as one of five categories: “adequate intensive,” “adequate basic,” “intermediate,” “inadequate,” or “unknown.” The category "adequate basic" refers to the minimum recommended level of care (for a pregnancy with no complications), while "adequate intensive" refers to a level of care exceeding recommended standards. The sum of the "adequate basic" and "adequate intensive" categories is the total adequacy score. In addition, the “inadequate” category can be subdivided to isolate those women who received no PNC. [For definitions of categories, please see the Technical Notes in the Appendix.]

[For more detail on the methodology of the APNCU Index, please call Center for Health Information, Statistics, Research & Evaluation at 617-624-5600].

Adequacy of Initiation Index

Category	Month Prenatal Care Began
Adequate Intensive	1 or 2
Adequate Basic	3 or 4
Intermediate	5 or 6
Inadequate	Month 7 or later, or no PNC
Unknown	Prenatal care initiation information not recorded

Adequacy of Received Services (Visits) Index

Category	% of Expected[1] Prenatal Care Visits
Adequate Intensive	110% or more
Adequate Basic	80 – 109%
Intermediate	50 – 79%
Inadequate	Less than 50%
Unknown	Information on prenatal care visits not recorded

Kessner Index of Adequacy of Prenatal Care: Definition of Categories

Category	Trimester Care Began	Number of Visits
Adequate	1	9 or more
Intermediate	1	5-8
	2	5 or more
Inadequate	1	1-4
	2	1-4
	3	1 or more
No prenatal care	--	0
Unknown	Unknown	Unknown

Summary of Major Differences in Categorization of Adequacy of Prenatal Care between the Kessner Index and the APNCU Index

The two different methods used in the Kessner Index and APNCU Index to calculate adequacy of prenatal care can result in differences in how each one classifies adequacy of prenatal care. These differences only occur under certain conditions, not in all cases (see "Explanation" column).

The Kessner Index classifies prenatal care as…	… but the APNCU Index classifies prenatal care as …	Explanation
Intermediate	Adequate Basic	This is primarily due to the fact that the APNCU Index allows for prenatal care in the 4th month of pregnancy to be considered adequate if the mother received 80-109% of expected visits, whereas the Kessner Index only allows for care begun in the first trimester (months 1-3) to be considered adequate.
Intermediate	Inadequate	This is primarily due to the fact that the APNCU categorizes any prenatal care beginning after month 4 as "inadequate" whereas the Kessner Index allows for care beginning in months 5 or 6 with 5 or more visits to be "intermediate."
Adequate	Intermediate	This is primarily due to the consideration of "expected" visits (based on when the mother initiated care and the length of gestation) using the APNCU Index, which bases expected visits on the ACOG recommendations,[1] which can be as high as 14 visits if a gestational period is 40 weeks, whereas the Kessner Index considers 9 visits sufficient in all cases.
Adequate	Adequate Intensive	The APNCU Index added an "Adequate Intensive" category, which is not used in the Kessner Index. This allows analysis of situations in which more than normal care is received (e.g. women with high risk conditions, pregnancy complications).

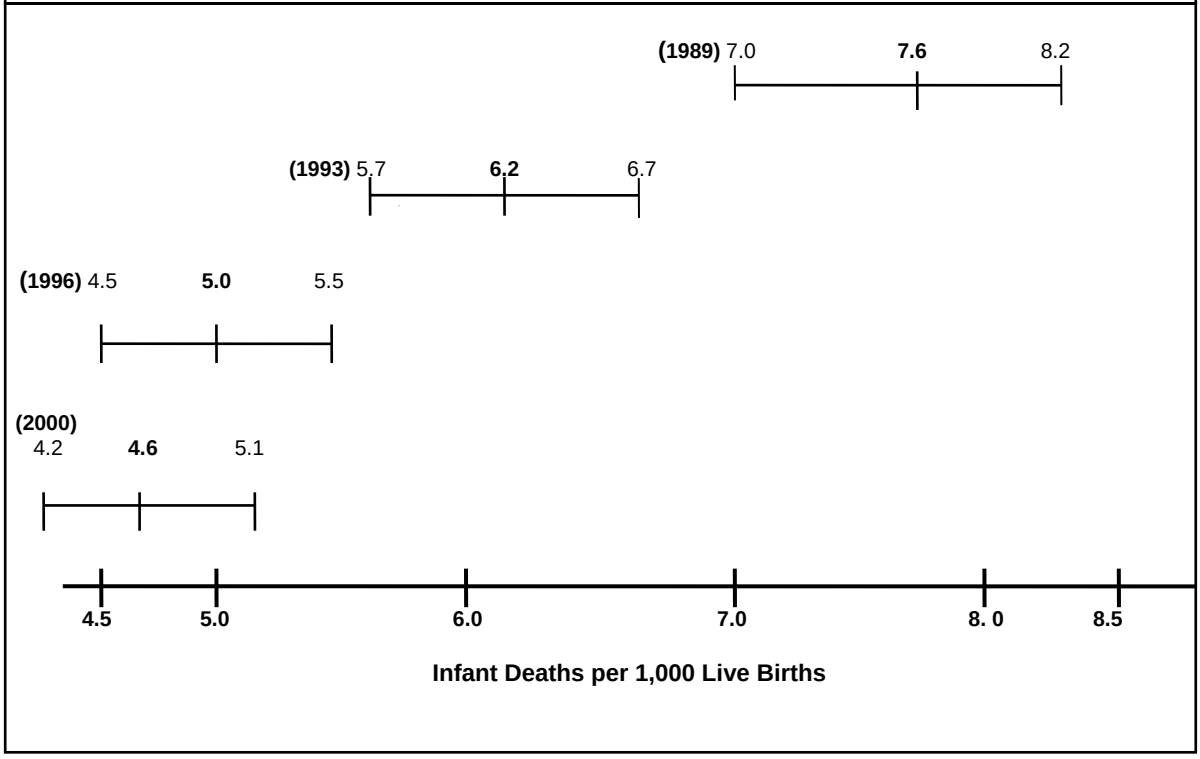
18. The number of "expected" visits is determined based on standards set by the American College of Obstetricians and Gynecologists (ACOG).

CONFIDENCE INTERVALS AND INFANT MORTALITY RATES

Beginning in the 1992 Advance Data: Births publication, 95% confidence intervals were added to the calculation of infant mortality rates (IMRs). The confidence interval (CI) provides a measure of stability of the IMR and a basis for comparing rates to determine if they are statistically different. Rates can be compared for the same group in different years, or for different groups in the same year. The width of the CI reflects the stability of the IMR. For example, a narrow CI reflects high stability, and a wide interval reflects low stability. If the CIs around two IMRs being compared do not overlap, the difference between the two rates is statistically significant. The following table and chart illustrate the concept of statistically significant differences using actual data from 1989, 1993, 1996, and 2000.

Comparison of Infant Mortality Rates and Confidence Intervals for Selected Years

Year	IMR (per 1,000 births)	95% Confidence Interval
1989	7.6	(7.0-8.2)
1993	6.2	(5.7-6.7)
1996	5.0	(4.5-5.5)
2000	4.6	(4.2-5.1)



The difference between the 1993 IMR and 1996 IMR is statistically significant – the confidence intervals do not overlap. The same is true for the differences between the 1989 IMR and each annual IMR for 1993, 1996, and 2000. However, the difference between the 1996 and 2000 IMRs is not statistically significant, since their confidence intervals overlap.

95% Confidence Intervals for Infant Mortality Rates, by Race and Hispanic Ethnicity, Massachusetts: 1990-2003

	Total[1]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian	
Year	n	**Rate**[2] (C.I.)	n	**Rate**[2] (C.I.)	n	**Rate**[2] (C.I.)	n	**Rate**[2] (C.I.)	n	**Rate**[2] (C.I.)
1990	649	**7.0** (6.5, 7.5)	442	**6.1** (5.5, 6.7)	98	**13.7** (11.0, 16.4)	77	**9.1** (7.1, 11.1)	24	**7.0** (4.2, 10.0)
1991	577	**6.5** (6.0, 7.0)	381	**5.5** (4.9, 6.1)	101	**15.0** (12.1, 17.9)	80	**9.4** (7.3, 11.5)	14	**4.2** (2.0, 6.4)
1992	569	**6.5** (6.0, 7.0)	371	**5.5** (4.9, 6.1)	110	**16.4** (13.4, 19.4)	67	**7.9** (6.0, 9.8)	16	**4.9** (2.5, 7.3)
1993	523	**6.2** (5.7, 6.7)	346	**5.3** (4.7, 5.9)	84	**13.1** (10.3, 15.9)	77	**9.3** (7.2, 11.4)	13	**3.9** (1.8, 6.0)
1994	499	**6.0** (5.4, 6.5)	343	**5.3** (4.7, 5.9)	79	**12.6** (9.8, 15.4)	64	**7.6** (5.7, 9.4)	8	**2.4** (0.7, 4.0)
1995	419	**5.1** (4.6, 5.6)	275	**4.4** (3.8, 4.9)	65	**11.1** (8.4, 13.8)	58	**7.2** (5.3, 9.0)	19	**5.5** (3.0, 8.0)
1996	403	**5.0** (4.5, 5.5)	289	**4.7** (4.1, 5.2)	63	**11.4** (8.6, 14.2)	40	**5.1** (3.5, 6.7)	8	**2.2** (0.7, 3.7)
1997	425	**5.3** (4.8, 5.8)	294	**4.8** (4.2, 5.3)	64	**11.7** (8.8, 14.5)	55	**6.7** (4.9, 8.4)	10	**2.6** (1.0, 4.2)
1998	414	**5.1** (4.6, 5.6)	294	**4.6** (4.1, 5.2)	64	**10.6** (7.9, 13.3)	55	**6.7** (5.0, 8.4)	10	**2.7** (1.0, 4.3)
1999	418	**5.2** (4.7, 5.7)	285	**4.7** (4.2, 5.3)	72	**12.3** (9.5, 15.1)	49	**5.5** (4.0, 7.1)	8	**1.9** (0.6, 3.3)
2000	377	**4.6** (4.2, 5.1)	232	**3.8** (3.4, 4.3)	74	**12.8** (9.9, 15.7)	48	**5.2** (3.7, 6.6)	19	**4.1** (2.2, 5.9)
2001	407	**5.0** (4.5, 5.5)	245	**4.1** (3.6, 4.7)	71	**12.1** (9.3, 14.9)	69	**7.3** (5.6, 9.1)	15	**3.1** (1.6, 4.7)
2002	397	**4.9** (4.4, 5.4)	239	**4.1** (3.6, 4.6)	69	**11.6** (8.9, 14.3)	67	**7.0** (5.3, 8.7)	16	**3.0** (1.5, 4.5)
2003	383	**4.8** (4.3, 5.3)	235	**4.1** (3.6, 4.6)	75	**12.7** (9.8, 15.5)	55	**5.6** (4.1, 7.1)	14	**2.7** (1.3, 4.1)

[1]Deaths of infants of unknown race are excluded except for the total calculation. For rate computations, births of infants of unknown race are allocated into the race categories according to the distribution of births of known race.
[2]Rates are expressed per 1,000 live births.

In 2003, the black non-Hispanic infant mortality rate was 12.7 deaths per 1,000 live births (95% CI: 9.8, 15.5), which was three times greater than the white non-Hispanic infant mortality rate of 4.0 (95% CI: 3.5, 4.6). The difference in these two rates was statistically significant. The rate of infant mortality for black non-Hispanics was also significantly elevated compared with both Hispanics (95% CI: 4.1, 7.0) and Asians (95% CI: 1.3, 4.1) in 2003.

DEFINITION OF RATES AND RATIOS

Age-Specific Birth Rate

The number of children born to women in a specific age group divided by the population of women in that specific age group, multiplied by 1,000.

$$\text{Age-Specific Birth Rate} = \frac{\text{Number of births to females ages X to Y years}}{\text{Number of females ages X to Y years in the population}} \times 1{,}000$$

Birth Rate

(See Age-Specific Birth Rate, Crude Birth Rate, Fertility Rate, and Teen Birth Rate)

Cesarean Section Rates

$$\text{Total C-section rate} = \frac{\text{Number of C-section births}}{\text{Number of occurrence births}} \times 100$$

$$\text{Primary C-section rate} = \frac{\text{Number of primary C-section births}}{\text{[Number of occurrence births-(number of repeat C-section births+VBACs)]}} \times 100$$

$$\text{Repeat C-section rate} = \frac{\text{Number of repeat C-section births}}{\text{(Number of repeat C-section births+number of VBACs)}} \times 100$$

$$\text{VBAC rate} = \frac{\text{Number of VBACs}}{\text{(Number of repeat C-section births+number of VBACs)}} \times 100$$

Crude Birth Rate

$$\text{Crude Birth rate} = \frac{\text{Number of resident live births}}{\text{Total resident population}} \times 1{,}000$$

Fertility Rate (sometimes referred to as "Birth Rate")

$$\text{Fertility rate} = \frac{\text{Number of births to females ages 15-44 years}}{\text{Number of females ages 15-44 years in the population}} \times 1{,}000$$

Fetal Mortality Rate

$$\text{Fetal Mortality Rate} = \frac{\text{Number of fetal deaths}}{\text{Number of fetal deaths plus live births in the same year}} \times 1{,}000$$

Feto-Infant Mortality Rate

$$\text{Feto-Infant Mortality Rate} = \frac{\text{Number of fetal deaths + Number of infant deaths}}{\text{Number of fetal deaths + live births in the same year}} \times 1{,}000$$

(Refer to the definitions of Fetal Mortality Rate and Infant Mortality Rate for more details.)

Infant Mortality Rate (IMR)
The death rate among infants less than one year old, per 1,000 live births.

$$\text{Infant Mortality Rate} = \frac{\text{Number of resident deaths of infants less than one year old in a year}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Interpregnancy Interval (IPI)
Interpregnancy interval is the time, in months, between the date of last menstrual period of current pregnancy and the date of previous live birth. IPI is calculated for each mother currently giving birth to their second or later child.

$$\%\text{Short IPI} = \frac{\text{Number of mothers giving birth to their 2nd or later child with IPI <12 months}}{\text{Number of mothers giving birth to their 2nd or later child in the same year}} \times 100$$

$$\%\text{ IPI 12 to 35 months} = \frac{\text{Number of mothers giving birth to their 2nd or later child with IPI between 12 and 35 months}}{\text{Number of mothers giving birth to their 2nd or later child in the same year}} \times 100$$

$$\%\text{ IPI 36+ months} = \frac{\text{Number of mothers giving birth to their 2nd or later child with IPI >=36 months}}{\text{Number of mothers giving birth to their 2nd or later child in the same year}} \times 100$$

Maternal Mortality Ratio (MMR)
The number of maternal deaths per 100,000 live occurrence births. The term "ratio" is used instead of "rate" in this report because the numerator includes some maternal deaths that were not related to live-born infants and thus were not included in the denominator.

$$\text{Maternal Mortality Ratio (MMR)} = \frac{\text{Number of maternal deaths}}{\text{Number of occurrence live births in the same year}} \times 100{,}000$$

Neonatal Mortality Rate (NMR)

The death rate among infants less than 28 days of age, per 1,000 live births.

$$\text{Neonatal Mortality Rate} = \frac{\text{Number of resident deaths of infants less than 28 days of age in a year}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Perinatal Mortality Rate

$$\text{Perinatal Mortality Rate} = \frac{\text{Number of fetal deaths from 28 weeks gestation plus infant deaths (less than 7 days old)}}{\text{Number of fetal deaths plus live births in the same year}} \times 1{,}000$$

Post Neonatal Mortality Rate

The death rate among infants 28 days of age to less than one year old, per 1,000 live births.

$$\text{Post Neonatal Mortality Rate} = \frac{\text{Number of resident deaths of infants 28 days of age to less than one year of age in a year}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Pregnancy-Associated Mortality Ratio (PAMR)

The number of pregnancy-associated deaths per 100,000 live occurrence births. The term "ratio" is used instead of rate in this report because the numerator includes some maternal deaths that were not related to live-born infants and thus were not included in the denominator.

$$\text{Pregnancy-Associated Mortality Ratio (PAMR)} = \frac{\text{Number of pregnancy-associated deaths}}{\text{Number of occurrence live births in the same year}} \times 100{,}000$$

Teen Birth Rate

$$\text{Teen birth rate} = \frac{\text{Number of births to females ages 15-19 years old}}{\text{Number of females ages 15-19 years old in the population}} \times 1{,}000$$

Total Rate of Change

Total rate of change between two numbers or rates is expressed as a percentage in this report (e.g. The Massachusetts birth rate decreased by 12% from 1990 to 1996.):

$$\frac{Pn-Po}{Po} \times 100$$

where, Pn = rate during later time period
Po = rate during earlier time period

Population Estimates for Massachusetts Communities, 2000

TOWN NAME	COUNTY	CHNA	POPULATION
Abington	Plymouth	22	14,605
Acton	Middlesex	15	20,331
Acushnet	Bristol	26	10,161
Adams	Berkshire	1	8,809
Agawam	Hampden	4	28,144
Alford	Berkshire	1	399
Amesbury	Essex	12	16,450
Amherst	Hampshire	3	34,874
Andover	Essex	11	31,247
Aquinnah (Gay Head)	Dukes	27	344
Arlington	Middlesex	17	42,389
Ashburnham	Worcester	9	5,546
Ashby	Middlesex	9	2,845
Ashfield	Franklin	2	1,800
Ashland	Middlesex	7	14,674
Athol	Worcester	2	11,299
Attleboro	Bristol	24	42,068
Auburn	Worcester	8	15,901
Avon	Norfolk	22	4,443
Ayer	Middlesex	9	7,287
Barnstable	Barnstable	27	47,821
Barre	Worcester	9	5,113
Becket	Berkshire	1	1,755
Bedford	Middlesex	15	12,595
Belchertown	Hampshire	3	12,968
Bellingham	Norfolk	6	15,314
Belmont	Middlesex	17	24,194
Berkley	Bristol	24	5,749
Berlin	Worcester	9	2,380
Bernardston	Franklin	2	2,155
Beverly	Essex	13	39,862
Billerica	Middlesex	10	38,981
Blackstone	Worcester	6	8,804
Blandford	Hampden	4	1,214
Bolton	Worcester	9	4,148
Boston	Suffolk	19	589,141
Bourne	Barnstable	27	18,721
Boxborough	Middlesex	15	4,868
Boxford	Essex	12	7,921
Boylston	Worcester	8	4,008
Braintree	Norfolk	20	33,828
Brewster	Barnstable	27	10,094
Bridgewater	Plymouth	22	25,185
Brimfield	Hampden	5	3,339
Brockton	Plymouth	22	94,304
Brookfield	Worcester	5	3,051
Brookline	Norfolk	19	57,107
Buckland	Franklin	2	1,991
Burlington	Middlesex	15	22,876
Cambridge	Middlesex	17	101,355
Canton	Norfolk	20	20,775
Carlisle	Middlesex	15	4,717
Carver	Plymouth	23	11,163
Charlemont	Franklin	2	1,358
Charlton	Worcester	5	11,263
Chatham	Barnstable	27	6,625
Chelmsford	Middlesex	10	33,858
Chelsea	Suffolk	19	35,080
Cheshire	Berkshire	1	3,401
Chester	Hampden	21	1,308
Chesterfield	Hampshire	3	1,201
Chicopee	Hampden	21	54,653
Chilmark	Dukes	27	843
Clarksburg	Berkshire	1	1,686
Clinton	Worcester	9	13,435
Cohasset	Norfolk	20	7,261
Colrain	Franklin	2	1,813
Concord	Middlesex	15	16,993
Conway	Franklin	2	1,809
Cummington	Hampshire	3	978
Dalton	Berkshire	1	6,892
Danvers	Essex	14	25,212
Dartmouth	Bristol	26	30,666
Dedham	Norfolk	18	23,464
Deerfield	Franklin	2	4,750
Dennis	Barnstable	27	15,973
Dighton	Bristol	24	6,175
Douglas	Worcester	6	7,045
Dover	Norfolk	18	5,558
Dracut	Middlesex	10	28,562
Dudley	Worcester	5	10,036
Dunstable	Middlesex	10	2,829
Duxbury	Plymouth	23	14,248
East Bridgewater	Plymouth	22	12,974
East Brookfield	Worcester	5	2,097
East Longmeadow	Hampden	4	14,100
Eastham	Barnstable	27	5,453
Easthampton	Hampshire	3	15,994
Easton	Bristol	22	22,299
Edgartown	Dukes	27	3,779
Egremont	Berkshire	1	1,345
Erving	Franklin	2	1,467
Essex	Essex	13	3,267
Everett	Middlesex	16	38,037
Fairhaven	Bristol	26	16,159
Fall River	Bristol	25	91,938
Falmouth	Barnstable	27	32,660
Fitchburg	Worcester	9	39,102
Florida	Berkshire	1	676
Foxborough	Norfolk	7	16,246
Framingham	Middlesex	7	66,910
Franklin	Norfolk	6	29,560
Freetown	Bristol	26	8,472
Gardner	Worcester	9	20,770
Georgetown	Essex	12	7,377
Gill	Franklin	2	1,363
Gloucester	Essex	13	30,273
Goshen	Hampshire	3	921
Gosnold	Dukes	27	86
Grafton	Worcester	8	14,894
Granby	Hampshire	3	6,132
Granville	Hampden	4	1,521
Great Barrington	Berkshire	1	7,527
Greenfield	Franklin	2	18,168
Groton	Middlesex	9	9,547
Groveland	Essex	12	6,038
Hadley	Hampshire	3	4,793
Halifax	Plymouth	23	7,500
Hamilton	Essex	13	8,315
Hampden	Hampden	4	5,171
Hancock	Berkshire	1	721
Hanover	Plymouth	23	13,164
Hanson	Plymouth	23	9,495
Hardwick	Worcester	9	2,622
Harvard	Worcester	9	5,981
Harwich	Barnstable	27	12,386
Hatfield	Hampshire	3	3,249
Haverhill	Essex	12	58,969
Hawley	Franklin	2	336
Heath	Franklin	2	805
Hingham	Plymouth	20	19,882
Hinsdale	Berkshire	1	1,872
Holbrook	Norfolk	22	10,785
Holden	Worcester	8	15,621

Population Estimates for Massachusetts Communities, 2000, continued

TOWN NAME	COUNTY	CHNA	POPULATION
Holland	Hampden	5	2,407
Holliston	Middlesex	7	13,801
Holyoke	Hampden	21	39,838
Hopedale	Worcester	6	5,907
Hopkinton	Middlesex	7	13,346
Hubbardston	Worcester	9	3,909
Hudson	Middlesex	7	18,113
Hull	Plymouth	20	11,050
Huntington	Hampshire	21	2,174
Ipswich	Essex	13	12,987
Kingston	Plymouth	23	11,780
Lakeville	Plymouth	24	9,821
Lancaster	Worcester	9	7,380
Lanesborough	Berkshire	1	2,990
Lawrence	Essex	11	72,043
Lee	Berkshire	1	5,985
Leicester	Worcester	8	10,471
Lenox	Berkshire	1	5,077
Leominster	Worcester	9	41,303
Leverett	Franklin	2	1,663
Lexington	Middlesex	15	30,355
Leyden	Franklin	2	772
Lincoln	Middlesex	15	8,056
Littleton	Middlesex	15	8,184
Longmeadow	Hampden	4	15,633
Lowell	Middlesex	10	105,167
Ludlow	Hampden	21	21,209
Lunenburg	Worcester	9	9,401
Lynn	Essex	14	89,050
Lynnfield	Essex	14	11,542
Malden	Middlesex	16	56,340
Manchester	Essex	13	5,228
Mansfield	Bristol	24	22,414
Marblehead	Essex	14	20,377
Marion	Plymouth	26	5,123
Marlborough	Middlesex	7	36,255
Marshfield	Plymouth	23	24,324
Mashpee	Barnstable	27	12,946
Mattapoisett	Plymouth	26	6,268
Maynard	Middlesex	7	10,433
Medfield	Norfolk	7	12,273
Medford	Middlesex	16	55,765
Medway	Norfolk	6	12,448
Melrose	Middlesex	16	27,134
Mendon	Worcester	6	5,286
Merrimac	Essex	12	6,138
Methuen	Essex	11	43,789
Middleborough	Plymouth	24	19,941
Middlefield	Hampshire	3	542
Middleton	Essex	11	7,744
Milford	Worcester	6	26,799
Millbury	Worcester	8	12,784
Millis	Norfolk	7	7,902
Millville	Worcester	6	2,724
Milton	Norfolk	20	26,062
Monroe	Franklin	2	93
Monson	Hampden	4	8,359
Montague	Franklin	2	8,489
Monterey	Berkshire	1	934
Montgomery	Hampden	4	654
Mt. Washington	Berkshire	1	130
Nahant	Essex	14	3,632
Nantucket	Nantucket	27	9,520
Natick	Middlesex	7	32,170
Needham	Norfolk	18	28,911
New Ashford	Berkshire	1	247
New Bedford	Bristol	26	93,768
New Braintree	Worcester	9	927
New Marlborough	Berkshire	1	1,494
New Salem	Franklin	2	929
Newbury	Essex	12	6,717
Newburyport	Essex	12	17,189
Newton	Middlesex	18	83,829
Norfolk	Norfolk	7	10,460
North Adams	Berkshire	1	14,681
North Andover	Essex	11	27,202
North Attleboro	Bristol	24	27,143
North Brookfield	Worcester	5	4,683
North Reading	Middlesex	16	13,837
Northampton	Hampshire	3	28,978
Northborough	Worcester	7	14,013
Northbridge	Worcester	6	13,182
Northfield	Franklin	2	2,951
Norton	Bristol	24	18,036
Norwell	Plymouth	20	9,765
Norwood	Norfolk	20	28,587
Oak Bluffs	Dukes	27	3,713
Oakham	Worcester	9	1,673
Orange	Franklin	2	7,518
Orleans	Barnstable	27	6,341
Otis	Berkshire	1	1,365
Oxford	Worcester	5	13,352
Palmer	Hampden	4	12,497
Paxton	Worcester	8	4,386
Peabody	Essex	14	48,129
Pelham	Hampshire	3	1,403
Pembroke	Plymouth	23	16,927
Pepperell	Middlesex	9	11,142
Peru	Berkshire	1	821
Petersham	Worcester	2	1,180
Phillipston	Worcester	2	1,621
Pittsfield	Berkshire	1	45,793
Plainfield	Hampshire	3	589
Plainville	Norfolk	7	7,683
Plymouth	Plymouth	23	51,701
Plympton	Plymouth	23	2,637
Princeton	Worcester	9	3,353
Provincetown	Barnstable	27	3,431
Quincy	Norfolk	20	88,025
Randolph	Norfolk	20	30,963
Raynham	Bristol	24	11,739
Reading	Middlesex	16	23,708
Rehoboth	Bristol	24	10,172
Revere	Suffolk	19	47,283
Richmond	Berkshire	1	1,604
Rochester	Plymouth	26	4,581
Rockland	Plymouth	23	17,670
Rockport	Essex	13	7,767
Rowe	Franklin	2	351
Rowley	Essex	12	5,500
Royalston	Worcester	2	1,254
Russell	Hampden	4	1,657
Rutland	Worcester	9	6,353
Salem	Essex	14	40,407
Salisbury	Essex	12	7,827
Sandisfield	Berkshire	1	824
Sandwich	Barnstable	27	20,136
Saugus	Essex	14	26,078
Savoy	Berkshire	1	705
Scituate	Plymouth	20	17,863
Seekonk	Bristol	24	13,425
Sharon	Norfolk	20	17,408
Sheffield	Berkshire	1	3,335
Shelburne	Franklin	2	2,058
Sherborn	Middlesex	7	4,200
Shirley	Middlesex	9	6,373

Population Estimates for Massachusetts Communities, 2000, continued

TOWN NAME	COUNTY	CHNA	POPULATION
Shrewsbury	Worcester	8	31,640
Shutesbury	Franklin	2	1,810
Somerset	Bristol	25	18,234
Somerville	Middlesex	17	77,478
South Hadley	Hampshire	3	17,196
Southampton	Hampshire	3	5,387
Southborough	Worcester	7	8,781
Southbridge	Worcester	5	17,214
Southwick	Hampden	4	8,835
Spencer	Worcester	5	11,691
Springfield	Hampden	4	152,082
Sterling	Worcester	9	7,257
Stockbridge	Berkshire	1	2,276
Stoneham	Middlesex	16	22,219
Stoughton	Norfolk	22	27,149
Stow	Middlesex	7	5,902
Sturbridge	Worcester	5	7,837
Sudbury	Middlesex	7	16,841
Sunderland	Franklin	2	3,777
Sutton	Worcester	6	8,250
Swampscott	Essex	14	14,412
Swansea	Bristol	25	15,901
Taunton	Bristol	24	55,976
Templeton	Worcester	9	6,799
Tewksbury	Middlesex	10	28,851
Tisbury	Dukes	27	3,755
Tolland	Hampden	4	426
Topsfield	Essex	13	6,141
Townsend	Middlesex	9	9,198
Truro	Barnstable	27	2,087
Tyngsborough	Middlesex	10	11,081
Tyringham	Berkshire	1	350
Upton	Worcester	6	5,642
Uxbridge	Worcester	6	11,156
Wakefield	Middlesex	16	24,804
Wales	Hampden	5	1,737
Walpole	Norfolk	7	22,824
Waltham	Middlesex	18	59,226
Ware	Hampshire	3	9,707
Wareham	Plymouth	26	20,335
Warren	Worcester	5	4,776
Warwick	Franklin	2	750
Washington	Berkshire	1	544
Watertown	Middlesex	17	32,986
Wayland	Middlesex	7	13,100
Webster	Worcester	5	16,415
Wellesley	Norfolk	18	26,613
Wellfleet	Barnstable	27	2,749
Wendell	Franklin	2	986
Wenham	Essex	13	4,440
West Boylston	Worcester	8	7,481
West Bridgewater	Plymouth	22	6,634
West Brookfield	Worcester	5	3,804
West Newbury	Essex	12	4,149
West Springfield	Hampden	4	27,899
West Stockbridge	Berkshire	1	1,416
West Tisbury	Dukes	27	2,467
Westborough	Worcester	7	17,997
Westfield	Hampden	21	40,072
Westford	Middlesex	10	20,754
Westhampton	Hampshire	3	1,468
Westminster	Worcester	9	6,907
Weston	Middlesex	18	11,469
Westport	Bristol	25	14,183
Westwood	Norfolk	18	14,117
Weymouth	Norfolk	20	53,988
Whately	Franklin	2	1,573
Whitman	Plymouth	22	13,882
Wilbraham	Hampden	4	13,473
Williamsburg	Hampshire	3	2,427
Williamstown	Berkshire	1	8,424
Wilmington	Middlesex	15	21,363
Winchendon	Worcester	9	9,611
Winchester	Middlesex	15	20,810
Windsor	Berkshire	1	875
Winthrop	Suffolk	19	18,303
Woburn	Middlesex	15	37,258
Worcester	Worcester	8	172,648
Worthington	Hampshire	3	1,270
Wrentham	Norfolk	7	10,554
Yarmouth	Barnstable	27	24,807

1. Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE), released January, 2002.

Population Estimates for Massachusetts Community Health Network Areas (CHNA) and Counties, 2000[1]

CHNA	POPULATION	COUNTY	POPULATION
1. Community Health Network of Berkshire County	134,953	Barnstable	222,230
2. Upper Valley Health Web (Franklin County)	86,889	Berkshire	134,953
3. Partnership for Health in Hampshire County (Northampton)	150,077	Bristol	534,678
4. The Community Health Connection (Springfield)	291,665	Dukes	14,987
5. Community Health Network of Southern Worcester County	113,702	Essex	723,419
6. Community Partners for Health (Milford)	152,117	Franklin	71,535
7. Community Health Network of Greater Metro West (Framingham)	374,478	Hampden	456,228
8 .Community Wellness Coalition (Worcester)	289,834	Hampshire	152,251
9. Fitchburg/Gardner Community Health Network	250,362	Middlesex	1,465,396
10. Greater Lowell Community Health Network	270,083	Nantucket	9,520
11. Greater Lawrence Community Health Network	182,025	Norfolk	650,308
12. Greater Haverhill Community Health Network	144,275	Plymouth	472,822
13. Community Health Network North (Beverly/Gloucester)	118,280	Suffolk	689,807
14. North Shore Community Health Network	278,839	Worcester	750,963
15. Greater Woburn/Concord/Littleton Community Health Network	208,406		
16. North Suburban Health Alliance (Medford/Malden/Melrose)	261,844	**STATE**	**6,349,097**
17. Greater Cambridge/Somerville Community Health Network	278,402		
18. West Suburban Health Network (Newton/Waltham)	253,187		
19. Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	746,914		
20. Blue Hills Community Health Alliance (Greater Quincy)	365,457		
21. Four (For) Communities (Holyoke, Chicopee, Ludlow, Westfield)	159,254		
22. Greater Brockton Community Health Network	232,260		
23. South Shore Community Partners in Prevention (Plymouth)	180,609		
24. Greater Attleboro-Taunton Health & Education Response	242,659		
25. Partners for a Healthier Community (Fall River)	140,256		
26. Greater New Bedford Health & Human Services Coalition	195,533		
27. Cape and Islands Community Health Network	246,737		

1. Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE), released January, 2002.

GLOSSARY

Adequacy of Prenatal Care Utilization (APNCU) Index
The Adequacy of Prenatal Care Utilization Index, developed by Dr. Milton Kotelchuck, is the measure used in this publication to classify the adequacy of prenatal care received by Massachusetts resident mothers. (*Please note: Beginning with Births 2001 publication, the Kessner Index was used to measure adequacy of prenatal care; please see definition for Kessner Index below*.) The APNCU Index has five categories (adequate intensive, adequate basic, intermediate, inadequate, and unknown), based on the month of pregnancy in which prenatal care begins and the percent of expected prenatal care visits for the time period during which a woman receives prenatal care services. Please see Technical Notes for more details.

Birthweight
The weight of an infant recorded at the time of delivery. It may be recorded in either pounds/ounces or grams. If recorded in pounds/ounces, it is converted to grams for use in this report.

1 pound = 453.6 grams
1,000 grams = 2 pounds and 3 ounces

Birthweight Categories

Normal birthweight (NBW):	An infant's weight of 2,500 grams (approximately 5.5 pounds) or more recorded at birth.
Low birthweight (LBW):	An infant's weight of less than 2,500 grams (5.5 pounds) recorded at birth.
Very low birthweight (VLBW):	An infant's weight of less than 1,500 grams (3.3 pounds) recorded at birth.

Cesarean Section or C-Section
Primary: A mother's first Cesarean section delivery.
Repeat: A Cesarean delivery that has been preceded by at least one Cesarean delivery.

Community Health Network Areas (CHNAs)
The Department of Public Health, in collaboration with health service providers, coalition members, and interested citizens, has designated 27 areas for community health planning. It is the Department's intention to foster in each of these areas the development of Community Health Networks – consortia of health care providers, human service agencies, schools, churches, youth, parents, elders, advocacy groups, and individual consumers – to address the health needs of the community. These community coalitions will participate in monitoring outcomes and progress of strategies and responses to those health needs.

It is hoped the Networks will mobilize around key health issues impacting the community, promote prevention efforts, enhance access to care, provide opportunities for more collaboration among agencies, and create a client-centered, outcome-oriented health service delivery system. Community Health Networks will also promote efficiency in service delivery by working to reduce duplication and overlap, and by identifying gaps in service.

Community Health Network Areas (cont.)

A Community Health Network Area (CHNA) is defined as an aggregation of cities and towns. In the current publication, we have presented some data by CHNA. To determine which cities and towns make up a particular CHNA, the table on pages 128-130 provides the appropriate CHNA code for each city and town.

The data published in this volume reflect the definitions of CHNAs instituted in January 1997 and the corresponding CHNA names.

Confidence Intervals

The confidence interval (CI) for the infant mortality rate (IMR) is a range of values that has a 95% chance of including the underlying risk of an infant death. Observed rates are subject to statistical variation; even if the underlying risk of infant death is identical in two subpopulations, the observed IMRs for the subpopulations may differ because of random variation. The confidence interval describes the precision of observed IMR as an estimate of the underlying risk of infant death, with a wider interval indicating less certainty about this estimate. The width of the interval reflects the size of the subpopulation and the number of infant deaths; smaller subpopulations with fewer infant deaths lead to wider confidence intervals.

Ethnicity

See the section in the Technical Notes of the Appendix entitled: “Changes in the Collection of Race and Ethnicity Information.”

Fetal Death

A stillbirth delivered, extracted or expulsed, at 20 weeks gestation or more and/or weighs 350 grams or more.

Feto-Infant Mortality Rate

The combined number of fetal deaths and infant deaths per 1000 live births and fetal deaths.

Healthy Start

A Massachusetts-funded program providing services and financing for prenatal care to low-income pregnant women who lack health insurance, but do not qualify for Medicaid.

Infant

A child whose age is less than one year (365 days).

Infant Death

Death of a child whose age is less than one year.

Kessner Index (Adequacy of Prenatal Care)
A measure of adequacy of prenatal care, used in *Advance Data: Births* and *Massachusetts Births* publications prior to 2001. The Kessner Index classifies prenatal care as one of 5 categories (adequate, intermediate, inadequate, no prenatal care, and unknown), based on the trimester in which prenatal care began and the number of prenatal visits. The classification adjusts for gestational age to allow for proper classification of premature births, and is as follows:

Category	Trimester Care Began	Number of Visits
Adequate	1	9 or more
Intermediate	1	5-8
	2	5 or more
Inadequate	1	1-4
	2	1-4
	3	1 or more
No prenatal care	--	0
Unknown	Unknown	Unknown

Live Birth
A live birth is any infant who breathes or shows any other evidence of life (such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles) after separation from the mother's uterus, regardless of the duration of gestation.

Low Birthweight (LBW)
See Birthweight Categories.

Maternal Death
The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes.

Mother's Birthplace
In this publication, birth characteristics are presented according to mother's birthplace: those who were born in the 50 states and District of Columbia, or "U.S. States / D.C."; those who were born in Puerto Rico, the US Virgin Islands, and Guam, or "Puerto Rico/U.S. Territories"; and those who were born outside of the U.S. and Puerto Rico/U.S. territories, or "Non-U.S.-Born".

Neonatal
Infants under 28 days of age.

Neonatal Death
Death of a child whose age is less than 28 days.

Non-U.S.-Born Women
See Mother's Birthplace.

Occurrence Birth
A birth occurring in the Commonwealth of Massachusetts, regardless of the residency of the mother. For individual cities/towns, an occurrence birth represents any birth occurring in that city/town, regardless of the residence of the mother. See Resident Birth.

Parity
The total number of live infants ever born to a woman, including the current birth.

Perinatal
Referring to the time period immediately before and after birth.

Perinatal Death
Death to a fetus of 28 weeks gestation or older or a live-born infant less than 7 days old.

Plurality
The number of births to a woman produced in the same gestational period. A singleton is the birth of one infant; twins represent the births of two infants, etc.

Post Neonatal
A child whose age is at least 28 days, but less than one year.

Post Neonatal Death
Death of a child whose age is at least 28 days, but less than one year.

Prenatal Care Source of Payment
Categories used in this publication include:

Public = Government programs including Commonhealth, Healthy Start, Medicaid/MassHealth, and Medicare (may be HMO or managed care), or free care;
Private = Commercial indemnity plan, commercial managed care (HMO, PPO, IPP, IPA, and other), or other private insurance;
Other = Worker's Compensation and other sources;
Self-paid.

Pregnancy-Associated Death
The death of a woman while pregnant or within one year of termination of pregnancy, irrespective of cause.

Race
See the section in the Technical Notes in the Appendix entitled: "Changes in the Collection of Race and Ethnicity Information."

Resident Birth
The birth of an infant whose mother reports that her usual place of residence is in Massachusetts. In Massachusetts, a resident is a person with a permanent address in one of the 351 cities or towns. Vital statistics data may be presented in terms either of residence or occurrence. All data in this publication, except all data in Tables 22, 23, 24, and selected data in Table 25 are resident data. Resident data include all events that occur to residents of the Commonwealth, wherever they occur. Occurrence data include all events that occur within the state, whether to residents or nonresidents. There is an exchange agreement among the 50

states, District of Columbia, Puerto Rico, Virgin Islands, Guam, and Canada that provides for exchange of copies of birth and death records. These records are used for statistical purposes only, and allow each state or province to track the births and deaths of its residents.

Vaginal Birth After Cesarean (VBAC)
A vaginal delivery of an infant to a mother who has had at least one prior Cesarean section delivery.

Very Low Birthweight (VLBW)
An infant's weight of less than 1,500 grams (3.3 pounds) recorded at birth.

Massachusetts Birth Certificate: 2003

USE ONLY STATE APPROVED RIBBONS AND MASS. STANDARD INK
AS REQUIRED BY GEN. LAWS, CHAP. 66, SECT. 4

1. RECORD NUMBER

768283

1A. CERTIFICATE NUMBER (DPH USE ONLY)

2. FACILITY NUMBER

22A. SOCIAL SECURITY CARD

INITIALS

22B. RESIDENT COPY

INITIALS

1. OCCURRENCE

R-101 • 100M • 10-98

CHILD

3. PLACE OF BIRTH — 3C. CITY/TOWN; 3B. COUNTY

3A. FACILITY NAME-IF NOT IN FACILITY, NUMBER AND STREET

NAME — 4A. FIRST; 4B. MIDDLE; 4C. LAST

5. SEX | 6A. PLURALITY | 6B. BIRTH ORDER | 7. TIME | 8. DATE OF BIRTH (Month, Day, Year)

SAMPLE

CERTIFIER

9A. NAME; 9B. TITLE

9C. CERTIFIER TYPE; 9D. LICENSE NUMBER

9E. NUMBER AND STREET; 9F. CITY/TOWN; 9G. STATE; 9H. ZIP CODE

MOTHER

NAME — 10A. FIRST; 10B. MIDDLE; 10C. LAST; 10D. MAIDEN SURNAME

BIRTHPLACE — 11A. CITY/TOWN; 11B. STATE/COUNTRY; 12. DATE OF BIRTH (Month, Day, Year)

RESIDENCE (Do not use mailing address) — 13A. NUMBER AND STREET; 13B. CITY/TOWN; 13C. COUNTY; 13D. STATE; 13E. ZIP CODE

FATHER

NAME — 14A. FIRST; 14B. MIDDLE; 14C. LAST

BIRTHPLACE — 15A. CITY/TOWN; 15B. STATE/COUNTRY; 16. DATE OF BIRTH (Month, Day, Year)

INFORMANT

17A. I (WE) CERTIFY THAT THE PERSONAL INFORMATION APPEARING ABOVE IS TRUE AND CORRECT.; 17B. RELATIONSHIP TO CHILD

17C. DATE SIGNED (Month, Day, Year); 17D. MAILING ADDRESS (If different from item # 13 above) — NUMBER AND STREET; CITY; STATE; ZIP CODE

CLERK

18. DATE OF RECORD (Month, Day, Year); 19. SUPPLEMENT FILED (Month, Day, Year); 20. CLERK/REGISTRAR

21. DPH USE ONLY

The Commonwealth of Massachusetts
DEPARTMENT OF PUBLIC HEALTH
REGISTRY OF VITAL RECORDS AND STATISTICS
STANDARD CERTIFICATE OF LIVE BIRTH

STATE USE ONLY

3D. REGISTERED NUMBER

Massachusetts Births 2003 Evaluation Form

TO OUR READERS:
In an attempt to better serve our users, we are enclosing this evaluation form. Please take the time to complete this questionnaire and return it to the address at the bottom of the page. Thank you.

What tables and charts do you find most useful?
What tables and charts do you find least useful?
Are there other tables and charts that you would like added to this publication? If yes, please describe them in detail.
Do you have other comments or suggestions?
Name (optional): **Address:** **(For those who received the publication by mail)** Is the mailing label address correct? If not, please correct the address. Thank you.

Please return your comments to:

Dr. James K. West
Research and Epidemiology Program
Center for Health Information, Statistics, Research and Evaluation
Massachusetts Department of Public Health
250 Washington Street, 6th floor, Boston, MA 02108

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